

Ren21 Renewables 2014 Global Status Report: India

Transcript of a webinar offered by the Clean Energy Solutions Center on 27 June 2014 —
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Webinar Panelists

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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 Renewable Energy Policy Network for the 21st Century also known as REN21. And today's webinar is focused on the watch of REN21's flagship report in Renewables 2014 global status report with a special focus on India.

One important note of mention before beginning the presentation 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. And a couple of the features for the webinars today; you have two options for audio, you may either listen through your computer or over the telephone and if you do choose to listen through your computer, please select the "mic and speakers" option in the audio pane that will just eliminate the possibility of echoing feedback and if you choose to dial in by the phone, please select the telephone option in the box of the right side will display the telephone number and audio pin that you should use to dial in and pin also just asks that you to meet your audio device player not cost any and if anyone has technical difficulties with the webinar you could make contact or to go to webinar's help desk at the number at the bottom of the slide.

The number is 888 259 3826. And we encourage anyone to ask any questions they might have at any point during the webinar and to ask your question you'll simply need to type it into the questions pane in the 'go to webinar window' and submit it through there and then I will present those questions to the panelists during the questions and answers session following the presentations. And if you're having any difficulty viewing the materials to the webinar portal, you will find PDF copies of the presentations at cleanenergysolutions.org/training and you may follow along as the speakers present also an audio recording of the presentations will be posted to the Solution Center training page within about a week of today's broadcast and we are also now adding webinars to the Solutions Center's YouTube channel where you will find other informative webinars as well as video interviews we thought caters on clean energy policy topics.

In today's webinar agenda centered around the presentations from our guest panelists; Christine Lins and Amit Kumar and these panelists are kind enough to join us to discuss what global changes happened in India over the course of 2013. To learn which technologies are contributing to increase power capacity and also to hear how changes in policies have affected Indian investments level and market development. And before our speakers begin their presentations, I'll provide a short informative overview of the Clean Energy Solutions Center initiative and in following the presentations we will have a question and answer session where panels will address the questions submitted by the audience followed by closing remarks and then a brief survey.

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

And there are four primary goals for the Solution Center. The first goal is to serve as a clearing house of clean energy policy resources. Second goal is to share policy best practices, data and analysis tools specific to clean energy policies and programs. Third is to deliver dynamic services that enable export assistance, learning and peer-to-peer sharing of experiences and lastly the center fosters dialogue and emerging policy issues in innovation around the globe. And our primary audience is energy policy makers and analysts from government and technical organizations in all countries but we also strive to engage with the private sector NGO's in civil society. Now this slide gives an overview of one of the marquee features that the Solution Center provides which is the no cost expert policy assistance known as 'Ask-an-Expert'. And Ask-an-Expert program

has established a broad team of over 30 experts from around the globe where each available to provide remote policy advice and analysis to all countries at no cost. So for example in the area of energy access, we are very pleased to have Abraham Raymond, director of the Social Transformation Division with the Energy and Resources Institute also known as TERI, serving as one of our experts, so if you ever need for policy assistance in energy access or any other clean energy sector, we do encourage you to use this valuable service and again it is provided to you free of charge. And to request assistance, simply go to cleanenergysolutions.org/expert and submit your request through the 'Ask-an-Expert form' on that page.

So in summary we encourage you to explore and take advantage of the Solution Center resources and services including the expert policy assistance that innovates the clean energy policy resources. Subscribe to the Solution Center newsletter and participate in webinars like this one. And now I would like to provide brief introductions for our distinguished panelists. Our first speaker today is Christine Lins and Christine is the executive secretary of REN21 and will be discussing key findings from the Ren21 Renewables 2014 global status report. And then following Christine we will hear from Mr. Amit Kumar the original program advisor for REEEP also known as the Renewable Energy and Energy Partnership where he is responsible for activities in the South Asia region. And so with, I will now let you welcome Christine to the webinar.

Christine

Thank you very much Sean. Good morning ladies and gentlemen. It is my pleasure to welcome you here also in my behalf on this webinar which will take us through the main findings of the global status report with the special focus on India.

The global status report by REN21 is an annual report. This year we launched it on the 4th of June at the Sustainable Energy for All Forum in New York. It is a report covering global industry market, investment policy trends in the field. Renewables has a dedicate section on history of renewed energy ion developing countries and for this year features an overview of the progress that we've made in the renewable energy sector of the last 10 years. It covers all sectors from power heating and cooling transport and all renewable technologies and is based on contributions from an effort of over five hundred people from all around the world including our co presenter organization, TERI who is our research partner for India.

So let me start by highlighting the last decade was a decade of unexpected growth or a decade where growth surpassed all expectations. Projected levels of renewables were evolving much quicker than many thought. We have a situation that many scenarios were actually ordinary forecast but surpassed and we have a situation where the organization capacity of group action from all renewable technologies have increased substantially over the last decade. Renewable power capacity excluding hydro powered

cords sum to over seventy four increase during the past decade from as you see on the back in the second line, 85 GW in 2004 to 560G GW in 2013. With this, costs of most technologies have decreased and support policies have continued to spread around the world which I think is a very good news and that it happens a bit later on. So like what renewable energy stand nowadays in the world, currently there are 19 percent of final energy consumption provided by renewables.

The modern renewable share and final energy consumption remain about level with 2011 even as they share modern renewables increase and this is because the rapid growth in modern renewable energy is somehow tempered by both slow migration way from traditional biomass and the continued rise of imported global energy into the market. Sustainable energy from all campaign sets the objective to double the share renewables from 2030 from 2010 levels from 18 to 36 percent. And it is clear that if we are to reach this year, increase efforts to speed up renewable energy development are needed as well as more action in the field of energy efficiency in order to curve the months up. Yes, you will see the different slides that we have made a lot of progress especially in the power sector but there is still a long way to go.

We are actually ranking about the renewable energy champion countries and when you look in absolute terms that is the first plan on the slide. You see the champions are China, the United States, Japan, the United Kingdom and Germany but then for the first year plan this year, we also get the share of investment related to GDP and there we get the completely different list of countries. There we get Uruguay, Mauritius, Costa Rica, South Africa, Nicaragua. So we see that the emerging and developing economies are making quite some effort in renewable energy investment. India is prominently featuring on the slide with being in the top five category several technologies such as hydro, CSP, wind and solar heating capacity and as well when you look in total capacities there also India is featuring quite prominent.

On this slide when you actually look to total renewable capacity installed per capita the Europe countries are leading. We have the situation where 42 percent of global non-hydro renewables capacity is located in Europe compared to less than 17 percent of global energy electricity remarks right? These renewable shares also explain the need of increase protection in the integration of arrived renewables in India to system in Europe where actually at the moment we have quite some discussion. So I'll take you now to different sectors.

In the Power Sector renewables comprise 26 percent of global power generation capacity and 22 percent of global electricity consumption is coming from renewable. Renewable accounted in 2013 for 56 percent of new installed power capacities or 56 percent of all new power plants where renewables is based and in India however the situation is a bit different. Their renewables are represented less than 70 percent of total

efficiency in 2013 due to India's rapidly expanding power capacity. In different part of the world, we have situation now that the renewables are achieving high levels of penetration for example throughout 2013, Wind power met 33 percent of electricity demand in Denmark and 21 percent in Spain and in Italy solar PV met 8 percent of total annual electricity remarks. So I think overall quite impressive figures, when it comes to heating and cooling, heat from modern biomass, solar and geothermal sources accounts for small but growing area rising share of final heat demand amounting to an approximate of 10 percent.

The use of modern renewable technologies for heating and cooling is still limited compared to their last potential. In India we have the situation that renewables processed used is used to fuel industries one more, and renewables makes the 11 percent of the final energy demand for heat. We have the situation that renewables used in the heat sector is expanding especially for distributing systems around the work for combined heat and power plant and also for industrial applications. When it comes to transport, liquid biofuels met about 2.3 percent of total transport fuel demand and we see that there's a limited but increasing interest in linking initiatives to promote electric mobility with renewable electric programs especially at a city and regional level. And I'm going quickly take you through the different technologies.

About 40 GW of hydropower capacity was commissioned in 2013 increasing the total global around 4 percent to approximately 1000 GW. We see that the modernization of ageing hydropower facility is a growing global market and we also see increase in recognition of the potential for hydropower to complement other renewable technologies such as variable wind and solar. India is number six for hydropower capacity and generation and number five for hydropower net capacity emission and we several projects coming at work. The solar PV market had a record year in 2013 adding about 39 GW of PV for a total capacity of 139 GW for the first time in history, more PV capacity was added than wind capacity during the year. We have seen spectacular growth in China accounting for nearly one-third of the global capacity followed by Japan and the United States. And we see the solar PV is starting to play a substantial role in the increase generation in some countries and with low prices of technology there are new markets opening from Africa to the Middle East to Asia and Latin America.

India is about 1.1 GW of PV capacity and India is ranked fourth of capacity of facilities larger than 50 MW. So there is also quite some progress there. Wind power in 2013 about 35 GW of capacity were added. That is an increase but still if we look at the overall market following several record years, the market was down nearly 10 GW compared to 2012. In 2013 there's primarily a steep drop in the US market. We have a record for offshore with about 1.6 GW added almost all in the EU and here India also plays an important role. India's ranked fourth for wind power capacity and net capacity efficiency. We have situation that

investment was delayed due to realization of rupee against US dollars and removal of some key support policies in 2012 but still India playing quite an equal control in the global market. In the field of Concentrating Solar Power, there we see that capacity increased by nearly 0.9 GW to reach about 3.4 GW while the United States and Spain remain the market leaders. Market continue to shift to developing countries and emerging economies with high level of insulation beyond the leading market's capacity nearly tripled with projects coming online in the United Arab Emirates, in India and in China.

There was addition including a 50 MW parabolic craft plant in Rajasthan and several projects are being developed under the National Solar Mission. In the field of Fire Energy the man continue to grow being the heat, power and transport sectors. Total energy consumption of biomass reached about approximately 57 in 2013 of which almost 60 percent was traditional biomass and the remainder was more than bio energy in the form of solid, gaseous or liquid fuels. Heating accounted for the majority of biomass with modern biomass. Heat capacity rising and global bio power capacity was up by an estimated 5 GW to 88 GW.

In India the small domestic scale biogas test tools that are being used to provide biogas-direct tools for example for cooking and India is among the top bio power producers ranked fifth for bio power generation and added about 0.4 GW of bio power capacity in 2013. As far as geothermal is concerned also additions there, the net increase was about 455 MW bringing the total global capacity to 12 GW. On Solar Thermal Heating and Cooling, there is also an increase. Solar water and air collector capacity reached an estimated 30 GW thermal by the end of 2013. As seen in the past China was the main demand anywhere, accounting for more than 80 percent of global market and India is ranked third for solar water heating capacity addition and we see that India and Japan are the largest Asian markets outside of China and also the use of solar cooling is rising in India and there is a great expectations for current and future market development in India in the field of solar thermal heating and cooling.

Now when it comes to Job in Renewable Energy sector, globally an estimated 6.5 million people work directly or indirectly in the renewable sector. Renewable energy employment continues to advance in more and more countries however the power of investments remains concentrated in just a few namely China, Brazil, the United States, India, Bangladesh and some EU countries. China remains the largest employer in the sector with about 16 percent of employment concentrated in solar PV and if I mentioned India is the market for the top countries for renewable energy employment and a recent study suggested that employment and wind, heat and solar PV remains about level with 2009 in India.

When it comes to global investments, global investment in renewable powers and fuels was at an estimated 214 billion US dollars in 2013 that is down 14 percent from 2012 and 23 percent is lowered in the record level

in 2011. If you include hydropower investments for hydropower in 50 MW investments will go to about 250 billion US Dollars. The reason for the decline was policy uncertainty in some parts of the world such as in Europe and the United States. In some European countries even retroactive policy changes and then also sharp reduction in technology costs.

Despite this decline, net investment in renewable power capacity outpaced fossil fuels for the fourth year running and when I say decline in technology cost when actually you look at the next slide you see that even the annual investment in solar PV declines nearly 22 percent. It is the gray line in the graph. New capacity additions increase for more than 32 percent that is the orange graph. And you see that for the first time these two; investment and solar capacity are not parallel but they go in different directions and that indicates the low module prices and this also of course shows that there are new opportunity for new markets to be developed. When looking at global investment by world regions despite the overall downward trend in the world investment the significant exemption of country level, Europe's renewable investments was down 44 percent from 2012 and despite of the overall decline of China's investment for the first time ever China invested one renewable energy than of all of Europe combined and it invested more in renewable power than in fossil fuels. 2013 brought a clear shift in investments moving east to Asia and Oceania as well as to the America excluding United States and Brazil.

The most notable investment shift to happen was in Japan where investment in renewable energy increased by 80 percent relative to 2012. India was the seventh largest investor in renewables excluding R&D. it invested about 6 billion US dollars and that's just in the half of 2011 and peaked of 12.5 billion US dollars so also there's quite some impressive appropriations as you also see on the second graph from the bottom line showing India. India also came in sixth for investment in wind power. So when looking in the policy as I said we're also tracking the policy landscapes and there we see that the situation hasn't grown quite rapidly.

In 200 there were about 48 countries with renewable energy policy targets to place at the end of 2013 I think this number went up to 144? We have 95 of these countries being emerging economies and developing countries and that is an increase up from 15 in 2005 so also there is a lot of progress made. We see that there's still promotion policies for renewables in the power sector and the prominent ones and there especially feed-in-tariffs and renewable portfolio standards but you also see that there are many countries that are making their way into the policy mix and you see there are more and more countries put in place heat obligations and bio fuel obligations. As I mentioned we have quite some revisions creative reductions in several countries mainly the US but we also see that particularly in Europe new policies are emerging to advance or manage the integration of high chairs of renewables in electricity, in existing power systems including for the support of energy storage advancement

and management and market technologies. There in India we also quite created an overview on the policy situation but I would skip that because I think we probably go in detail with this presentation.

As far as distributed renewable energy is concerned, energy excess and the use of distributed renewable energy is increasing on all developing continents except Africa, growth in total population electrified is bigger than the growth in total population in Africa however the population growth rate exceeds the rate of electrifications and there are only 3 percent of the population electrified so there is a long way to go. We see new finance models for rural energy markets emerging and we see also industry solutions in the form of mini-grids or ICT applications. In India the number of people with excess on electricity roles by 70 million to 206 million over 80 villages have operated mini-grids using [27:45] produced in 2013. And clearly, India and some other countries leading in the development of large scale off grid renewable programs to address energy excess and sustainability issues.

So let me conclude here with the statement of global perception of renewables in the past decade has shifted considerably. Today renewables can be found in the mainstream and are the preferred energy source of the general public in many parts of the world and nevertheless although the figures presented in the global status report clearly documented advancement during the last decade, it is clear that we need to move faster and more deliberately if we are serious about doubling the global share of renewables by 2030 and about ensuring access to clean and sustainable energy for all by 2030. For this become a reality, we need a more rigorous integration of renewable energy systems. We need to level a playing field for higher energy sector.

We still have a situation that causes fuel subsidies outpaced by far renewable support of majority level. We need long term differentiate table policies and I think in the future we need to pay a greater attention to the heat and cooling sector as this is an area where an large share of final energy is consumed and last but not the least, we need to improve the other situation in order to be able to monitor more advancements in renewables especially in the field of hits and collides of distributed renewable energy. And for this transition to happen, close collaboration between all actions from the public and the private sectors will be needed. We will continue to work in that area. I would like to thank you for your attention and I will give the floor to Kumar from TERI to take you through this presentation and his findings. Thank you very much.

Amit

Good morning everyone and thank you Christine for very excellent overview of global analysis review. Well like in the past, I being last in the panel most of the things which I want to provide they've already done it. Next, I would like everyone to know that I focus on to India and intentionally I would like to cover first about the rationale before going for

renewable energy in India and what are the key drivers for renewables in India are.

So unlike many of the development concerns, bills, climate change, you would be guessing what the key drivers for renewable energy is concern in India the renewable energy that is needed for its development. So we are in developing countries, we have high aspirations but on the other hand we don't have much of that energy tool in this kind of growing needs. And on top of that we also import a lot of fossil fuels which we are using for our energy generation. So if I look at drivers for renewable energy in India, there are two sources. One comes to the energy from the east side and other from one other side.

As Christine also mentioned in her presentation, we have a lot of different offers of electricity supplies on site. And despite of our growth spikes over the years as far as rural electrification is concerned we still have close to 300 million people who do not have access with electricity. Even the villages which are supposed to be electrified directly supplied electricity did not do very good. It's quite erratic and as far as other energy needs is concerned 80 percent of rural are definitely known. Traditional fuels such as biomass which again is being applied in very efficient manner. Now one of the distinguished areas carried out so that if you were to work in business scenario. By 2031 our crude oil dependency would be quite high. Right now as far as crude oil is concern our dependency on imported crude oil is about 75 percent but it could go to 88 percent in 2031. Quite interestingly while we call ourselves as coal rich country our dependence on oil import actually could go as high as 72 percent by 2031. In fact right now also we are importing quite a bit of coal because of various reasons.

On the other hand as far as the environment around are concern we are talking of two levels. One is macro level, there we are talking about global climate change and those scenarios and on the micro level, these are the local level if we want to go to a much cleaner environment. And now if you look at levels on dark and clear so dark because very clear is to white there isn't a need for renewable energy on that and white is just considered to be so important in our overall energy discourse. And there are very many needed for dark fortunately India's development of fuel potential of different kind of renewable energy sources but that we are talking about solar, with that we are talking of wind, it's more of hydro, biomass, you name it we have all those resources. And more importantly when we look at our geography, our population is quite dispersed. So that means we look for solutions which are not only same place in terms of mega power plant which are connected to national transmission grids but we are also looking on solutions which can provide us decent drive solutions whether that be talking of average electricity solutions or we are talking of decent lists of solutions in terms of industry with domestic requirements and all. And renewables are such the resources by virtue of the fact that they are sole distributor for the country. They can actually address both of these issues.

So from that perspective in India renewable energy markets can be divided partly into three categories. One is of course is the global scale electricity which normally people are talking about the most then there are off grid or distributed electricity system here that focus more on electrification. And those villages there because of technical constrains or because of financial rivalry streak normal grids are not interestingly time to call. And the third market category these are the target market system where one is talking about industrial processes, domestic water heating systems, cooling, all those kinds of things.

Fortunately we have quite a good enabling environment in terms of quality for carrying out renewable energy from western India. In fact, we started off on this program way back in 1970s after the first oil show and since then gradually participated in the world and lot of main policy came known and that's what you're looking at as far as electricity from renewable energy is concern our main electricity in 2003 very clearly takes care of renewable energy promotion and we very clearly see that all the electricity which has to be procured from distribution completion in next year. The certain portion of that has to be mandated from renewable energy. So that are all of our mainstream policies to merge when talk about renewable energy will be talking of national electricity policy we'll be talking about the energy rectification program so on and so forth. The next that came into picture was national action plan on climate change which was unveiled in 2009.

Now the national action plan on climate change has eight national missions and national solar mission which is also known as was one of them. In fact this was the first mission we tried to actually launch. So you can see there in the overall and grid of national plan on climate change renewables becomes one of the key components of there. So national action plan on climate change on 100 off the boats national solar missions which are focused on efficiency installer but also talks very much on other thing and which is renewable energy beats forward mission because it mandates that the goal is to have 15 percent energy generation, electricity emission by 2032 to come from renewable energy. And here we are talking of 15 percent of energy generation not 15 percent of its stored capacity because right now it terms of energy shared it can be on 5 percent or so and they are talking of by 2032 rise to 15 percent. And then after the national solar mission, a lot of estates have also come up with their solar policies and in fact most of the government estates also have their own renewable energy policy. So both limits at the factory level as well as the provincial levels they are enabling policies to support renewable energy. Now this picture shows how the grid connectors fill in India and this is a picture as of March 2014 and you can see that overall additives have come to about 72 GW and in terms of its share in stored capacity of total power emissions in India comes out together 13 percent.

Now one point to be noted over here is that when we talk of reconnected rest in India we are not considering large hydropower plants; so we are

talking only of new non-conventional small hydropower plants in this whole scenario and which is at 225 MW. And as far as renewable power is concerned we have about 1000 MW coming from renewables right now. As I was telling that national action plan on climate change has a target that 15 percent of overall electricity generation has to come from renewables in 2021-22. And if that were to be achieved then this graph show us to how we will move forward and again you'll notice that renewable would be the main say of this scenario. This pictures shows a very graphic as to what generation of that is national mission and solar mission targets are and as you see the segment whether into three levels the faster it was from 2010 to 13 which was more of experimental and variables.

Now we are into 2013-17 fifth year, lesson which I've been learning prior to it are going to be in cooperative into policy strength in order to take it forward. And by 2032 the target is to have 20 GW of grid connector solar power in India. And that is indeed very ambitious goal because they will notice that we started off in 2010 and started on 10 MW of solar panels with connected capacity of solar energy, we are talking of 30 GW by 2022. Now, one interesting thing which I would like to emphasize as what as national mission and solar mission is concerned, every tap of national mission and solar mission normally are bigger taps only about 20 GW of grid connectors for the mission but actually this solar mission covers the whole grid of solar energy supplied addition whether it is grid connector or the directives; off-grid solutions, roof-top solutions, anywhere solutions which are meant for meeting thermal energy requirement for heating and cooling.

So right from very drastic solar lantern to grid connector power mission makes national solar mission actually towards everything. And one of the important goals of national solar mission is also that it wants to encourage domestic indigenous manufacturing and that has to be kept in thought as we are talking of national solar mission. Now apart from the policy which I just talked about who facilitates renewable energy promotion in India, we also have very good energy consultation and in fact all the major global instrument as far as regulations for renewable here in India. We have renewable policy obligation and in that we also have separate portables for solar. So in order to promote solar specifically solar portables also carry out all those overall renewable policy obligations at the distribution level. We have figures directs again basing this on the technologies so depending on the majority of the technology so we can direct figures and since electricity, the concurrence of heat in India, it is both at the safety level and government level. Each estate has a split electricity level of ticker mission and that regular ticker mission decides what kind of fuel it's going to have for that estate, what kind of fillings are going to go in there. so that means we have lots of diversity as far as our fuels and fillings there is for different technologies are concerned in India.

We also have the market with mechanisms introduced a couple of years ago which is renewable energy electricity. Then the regulation also specifies that it has to be provided access to renewable energy electricity. Dealing of electricity from one part to part devolved connector and banking of electricity, that's one interesting concept that we can bank renewable energy electricity that is if I have it formed and it gives you electricity but as a user I don't have any requirement of that electricity now I can bank that electricity with the utility and at some later part of time I can draw that electricity from the grid. And that becomes very effective to natural power mission which are at times have to depend on different power for their industrial needs. And also third party solar is also allowed in many of the estates and the point is that the generator does not have to sell power only to the estate utility, they can sell it to other clients also.

Of course there are some charges and taxes included on that. Very important thing which has occurred in last one and a half years is about pre-order and why it is important is the fact that I forgot to look at which lot of things for the mission takes place in months and segments. But in itself there is not much of requirement about powering that thing but there would be many other restricts at that point in time which would require power. It also happens that as far as renewable energy electricity are concerned. We have many of that here which are actually efficient as far as the renewable energy resources are concerned. They can actually get power from estates which have abundant renewable energy sources but in the sense of boot and strong transmission line it is difficult to actually task it from to daily.

So whole electricity was taken up by government of India to see that how different transmission lines which can connect renewable energy resources which it takes to know estates who do not have that many resources and thereby creating a free flow of renewable energy from point A to point B was considered and that is from the free connector. And it is based on the fact that based on the plans, we are talking about that by 2017 and this is actually resulting from a five-year plan and that has expected of five-year plan.

So in the five-year plan we are talking of having about 41 GW of renewable energy coming from renewables and that will take accumulated capacity to 66 GW. So power mission connector has to be set up in level not only transmission of this electricity from point A to point B but also absorption of this electricity in that state itself. Today for 1240 transmission capacity that kind, one has to run free policy station for electricity because the cable did not able to absorb that kind of power. So green connectors breaks to address both of these things and the splitter cost for this is about 7 billion US Dollars and we have already started on this. This is how India stands, that's what I knew as far as the universe is concerned and it does not end there in top ten countries. And what has happened in last year was a way that lot of product equity is taking place in renewable energy in India. And not only in the land reconnected

segments but also in Oxbridge estates. This is public and private R&B in 2013 and again of course India shares qualified compared to Europe or China but it still exceed and it's actually growing.

This slide show actually the presence of renewable power reconnected and power development in India and as you noticed that from 2009 and 2011 also it was quite a system increasing partly but after that from 2012, it started declining. And the reasons which Christine also noted to was that some of the key benefits which are were acquired to power sectors were actually withdrawn.

One was isolated the precision benefit and another was generation build is simply, now isolated that precision benefit mandated also worries serving up wind power plant and its profit making. 80 percent of the capacity cost of the capacity of the west can actually book as the precision benefit and that is to help developing communities and big industries quite a bit. So what happened back in 2011 onwards? Three things happened; one was that there was a goal of isolated deposition, there was a goal of another nonconventional source of generation efficiency and it also concentrated in the down term of the economy in the country as a whole. So the market in any case was facing a lot of liquidity problem, so in the field were most of the people whatever little money they have to put it in their business other than putting in other thing.

So all these things put together actually have contributed in the scenario of dark green power installation actually were not selected during that time. Now last year generation building incentive has now this tool and it is hoped that the budget which is going to come on tenth of July this year. Isolated the precision benefit could also be continued.

So I think these two sentiments and also the fact that the new government's interest in white crude renewables is creating a situation that we are again where energy market is looking up. We are talking of launching green energy mission which apart from looking at this kind of phenomenal solution I'm also going to focus on offshore green findings in coming year we'll meet again going through growth as its usual case. This is a talking the advancement of energy system in India and I think we'll see that for as long in India it went up the tenth of wind energy purchase. This graph shows that how solid we have grown after the launch of national solar mission. As I was tell in March we are having close to 10 MW of capacity and today we are talking of close to 2.6 GW and again if everything works well this is going to again increase even more.

CSP also came into picture after the launch of national solar mission of course what we're hoping that the share of CSP and PV in the first period of solar mission target of 1000 MW will be fifty-fifty but I think that would differ because the prices dropping was too drastic and CSP was not able to compete on that but still we are talking about seven CSP plants in India right now which are two of them are already come up and rest of

them are in the process of coming online. So I'm not going to walk through this table. This gives the details of these seven CSP plants and this Christine already shown that how India figures as far as global investments and capacity additional are concerned.

So let me come to the conclusion by bringing out India's strength as far as renewable energy sectors are concerned. If you have validated the plot of R&B section, B we have quite met for close adding circuit solution so if we are talking of R&B grid and doubling portal grid of having installations of renewable energy in India, adaptation of technology in segment of labs as well but are to be employed and deployed in India. We have good sector to take care of there. We also have good marketing deals for all kinds of equipment but if we are talking about large scale power mission or we are talking of very small scale lands. So we have a very good marketing deals and we also have skilled manpower not as compared to the kind of requirements we are talking about if it is still a lot of deficiency over there but again we are taking each step to acting on the particular problem but give and take we have a good skilled manpower and more importantly if you try to look at the location of India, we are only about the domestic division of the new member, we are also with the fossil fuels.

Other upcoming markets in all over India and that put India in a very strategic locational advantage now for renewable energy industry. And just to sum up so India has abundance of solar energy sources and that actually makes it one of the cornerstones of overall integrated energy policy. Also in India we are definitely moving to that direction and as I have just tried to explain, we are very ambitious renewable plan and we are trying to go out of there. At times there are peak falls but all we are trying to move in that direction. Thank you very much.

Sean

Great thank you Amit and thank you Christine for that presentation and at this point in the webinar we'll move on to the question and answer session. So again panelist if you have any, I'm sorry attendees, if you have any questions for the panelists you can go ahead and submit those to the question pane in the 'go to webinar' window. I did receive a couple questions so start with those. In this one's for both Amit and Christine maybe will start with Amit so he can talk about the question in reference to India. The question is, Can you please elaborate a little on the job creation in the removal sector particularly in solar PV in CSP?

Amit

As for this job creation in solar sector for CSP concerning, it is actually contributing quite handsomely and it's not only solar PV actually job creation has started by watching over very large solar heating system program. So lot of industries in marketing sector as far as job in the solar installation and designing those kinds of jobs had already been there at the sectors are going. Now the line jobs, national solar mission large jobs capacity in terms of job creation actually have been in solar PV. And we are talking of adding about 2000 GW in last couple of years and that

actually required large of manpower again at different levels. Like at the top, the design level to the installers, to the EPC people and couple of that lot which we have done are going in the Oxbridge pane and there the job creation actually is much more because you require not many people right from the engine which represents this kind of actual people who are setting up this kind of systems over there so again I don't have precise numbers with me but since we have the numbers of micro bills and so many millions of solar lanterns and so many small solutions that we view it in return which have been along the and lots of jobs have been catered there. as for this year is concerned, solar CSP is still taking ship in India so compared to PV job creation in CSP they are not that many yet there are in terms of EPC and design but again most of the technologies for solar CSP plants have been actually imported, so that we foresee that these technologies are domesticated, these are indigenious. There are manufacturing plans to manufacture these kinds of CSP technologies, many more jobs will be catered and therefore we are profited for. Hello?

Sean Yes, thank you Amit and so a follow up question for that just came in. what is your opinion in the job opportunities for new engineers in India in the wind industry?

Amit My take on new engineers in wind energy as well as in renewable energy sector in India is very, very positive because engineers are something which are we have in very short supply and especially those engineers which are caring actually on renewable energy who are specializing in renewable energy are actually much in demand. So I think as the sector grow this is definitely going to be a growing field as far as renewable energy and engineering segment is concerned. Hello?

Sean Thanks again, Amit. And Amit, switching gears now to a different topic. What do you see as the future role of off grid renewable energy resources in India? Can you expand a little bit on that?

Amit Yes, considering the national geography of beyond looking there and considering the energy supply situation, I think for a long time to come off grid solutions are going to play a very important role in overall energy supply situation in India is concerned from the point of energy absence. So I don't see any reason as to why we don't have to put a lot of interest in off grid solutions because as I said earlier the resources when we're talking about renewable energy and modern distributor so and if I combine that with huge transmission and distribution we shall loss it. At times it makes more sense who have cumulative higher oil power mission than off grid solution and I believe there are energy needs rather than getting the power on large power transmission network and supplies which are not effective most of the time. Even if I were to consider that at some point of time we would have a natural grid being extended to this rural region I see that we are going to have off grid solutions which are grid ready that means adding conversion grid extend to that point. These renewable solutions are actually coupled with those emission grids.

- Sean** Thank you, Amit and another question came in in regards to off grid renewables. Do you know where or is there any data on how that 1 GW of off grid renewable capacity that you mentioned that's been added, is there any data on how that has broken up as far as what renewable energy technologies?
- Amit** Actually that is not very popular to me but ministry of renewable energy would definitely have those kind of data but I will feed that on public domain you won't find this abbreviated data for that.
- Sean** Thanks Amit and next question I have...
- Christine** Add me I'll be coming here as well. Sean can I just add to Amit's answer, in general we have a situation about accurate data about distributed of renewable energy, this is something that REN21 and its partners are currently looking in so and we're in the process of developing theories or reports looking on distributed renewable energy in different areas.
- We will start with southern part and Africa but we will then briefly move to Asia because we see that there is a lot of potential and if we are serious to provide energy access to all by 2030 we need to get better policies and also for this better solutions on the distributed off grid renewable energy markets and technology missions. Thank you.
- Sean** Thank you Christine and Amit, this question is for either one of you. What is your review on India's entry to tap offshore wind?
- Amit** See India definitely aiming to enter into offshore wind sector as the upcoming wind energy mission is aiming for that. Strategies call on offshore wind assessments have already started and some of the pilots are going to taking place near...
- Sean** Thanks Amit and last question I received so far is Amit, what are your expectations of renewable energy initiatives coming from the new government in India?
- Amit** See we all quite agree as far as the new government stands on renewable energy is concerned because Mr. Mordy himself reported support of renewable energy and he had done lot of good jobs so we are looking forward to many new initiatives in upcoming budget which is going to be on the 10th of July. What I understand that there are plans efforts to launch about 50 solar pads and when we talk of solar pads, they are they are concentrated capacity also energy power missions. So we are looking forward to having number of solar pads supported by the government of India. In the previous year, some of the incentives which are withdrawn though that one could be which are likely to be introduced in the coming budget and we definitely see that rather we thought of the current budget is very good effects to renewable energy. So we have an update about that.

Sean

Great, thanks again and like I said that is the last question I received so at this point we will move along to the quick survey that we have for the audience and we just have three questions for you to help us evaluate how we are doing and improve for future webinars so Maureen if you could go ahead and display the first question and the question is the webinar content provided me with useful information insight? And the next question the webinars presenters were effective and then the final question is overall the webinar met my expectations. Great, thank you for answering our survey before we wrap up I just like to give both Christine and then Amit a chance for any closing remarks that they might have. Christine of you have any.

Christine

Thank you very much Sean, I would like to thank Amit for his good insights into the Indian renewable market. I'd like to thank National Energy Department for hosting today's webinar. I am convinced that we are gonna see a lot of very interesting development in the field of renewables in India. I think progress there has already been quite impressive throughout the last years. With all the rapid increase in development of the country and increase in power need. We will definitely see impressive product developments for renewables looking forward to continuing to work with you and hope to see you some of you again in next year's webinar. Thanks a lot.

Amit

I just want to reiterate the fact that I definitely see a lot of potential and a lot of emphasis being put on renewable energy in India for a variety of reasons which I enumerated. So I am definitely happy throughout this sector as far as India is concerned and I would also like to take this opportunity to thank Christine and to thank Energy Solutions, Maureen, and Sean. Thank you very much.

Sean

Great, thank you both again for the presentations. Thank you attendees for joining us for today's webinar and again if you would like to view the PDF versions of the slides you may view that at cleanenergysolutions.org/training and we will also be posting an audio recording of today's webinar to that page within about a week. So you may go out there and listen again or share with your networks and organizations and also if you would like to view other webinar recordings and interviews with thoughts regarding clean energy. We are posting videos to the clean energy solutions center YouTube page that is the link at the bottom of the slide there and so with that I hope everyone has a great rest of your day and we hope to see you again in future clean energy solutions center events and this conclude our webinar.