CLEAN ENERGY SOLUTIONS CENTER
ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

Addressing Challenges in Clean Energy Investment

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Webinar Presenter

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Eric Hello everyone. I'm Eric Lockhart 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 U.S. Department of Energy. Today's webinar is focused on the Clean Energy Investment Center.

One important note to 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 resources library as one of many best practices, resources reviewed, and selected by technical experts.

Before we begin, I'll quickly go over some of the webinar's features. For audio, you have two options: you may either listen through your computer or over your telephone. If you choose to listen through your computer, please select the mic and speakers option in the audio pane. Doing so will eliminate the possibility of feedback and echo. If you choose to dial in by phone please select the "telephone" option and a box on the right side will display the telephone number and audio pane you should use to dial in. Panelists, we ask that you please mute your audio device while you are not presenting. If anyone is having technical difficulties with the webinar you may contact the GoToWebinar's help desk at 888-259-3826 for assistance.

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posted to the Solutions Center training page within a few weeks and will be added 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 center around a presentation from our guest panelist, Dr. Sanjiv Malhotra. He has been kind enough to join us to discuss the activities of the Clean Energy Investment Center. Before he begins his presentation, I'll provide a short informative overview of the Clean Energy Solutions Center initiative. Then following his presentation we will have a question and answer session where the panelist will address questions submitted by the audience, followed by closing remarks and a brief survey.

This slide provides a bit of background in terms of how the Solutions Center came to be. The Solutions Center is one of thirteen initiative of the Clean Energy Ministerial that was launched in April of 2011 and is primarily led by Australia, the United States, Sweden 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, not-cost expert policy assistance, peer-to-peer learning and training tools such as the webinar you are attending today.

The Solutions Center has four primary goals. It serves as a clearinghouse of clean energy policy resources. It also serves to share policy best practices, data and analysis tools specific to clean energy policies and programs. The Solutions Center delivers dynamic services that enable expert assistance, learning, and peer-to-peer sharing of experiences. And lastly, the Center fosters dialog on emerging policy issues and innovation around the globe.

Our primary audience is energy policy makers and analysts from governments and technical organizations in all countries, but we also strive to engage with the private sector, NGOs and civil society.

A marquis feature 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 available to provide remote policy advice and analysis to all countries at no cost. For example, in the area of energy and finance we are very pleased to have David Nelson serving as one of our experts.

If you have a need for policy assistance in clean energy finance or any other clean energy sector, we encourage you to use this valuable service. Again, the assistance provided free of charge. If you have a question for our experts please submit it through our simple online form at cleanenergysolutions.org/expert. We also invite you to spread the word about this service to those in your networks and organizations.

With that, I'd like to introduce our speaker for today, Dr. Sanjiv Malhotra. Dr. Malhotra is the director of the Clean Energy Investment Center at the United States Department of Energy. As director, he oversees the Center that serves as a single point of contact for investors to access technical experts, acquire

the latest reports on Clean Energy Technology and identify promising projects.

And with those introductions, I'd like to welcome Dr. Malhotra to the webinar.

Sanjiv Thanks Eric. Firstly I would like to thank Stephanie and Eric and the other team members from the Clean Energy Solutions Center for hosting this webinar, as well as my team members, Ken, Marcos, Marilyn and a few others who have been instrumental in getting this webinar ready and doing so in a very short period of time.

This is a very opportune moment to host this webinar especially to talk about clean energy investment because we are almost at the one-year anniversary of the very historic COP 21 discussions that we had in Paris last year. And definitely, or very clearly the COP 21 discussions were very historic because that was the first time that there were public and private sector entities on a global platform that made the commitments to either double the investment in clean energy R&D or from the private sector there was an announcement Breakthrough Energy Coalitions led by Bill Gates for setting up a fund that would be investing in early stage clean energy R&D.

So we will be talking about Paris but as we get ready for moving towards COP 22 on Marrakesh we felt that this is the right time, the right platform to share what we have seen in terms of investment and early stage clean energy technologies.

So as we sit here today, there are multiple observations, and some of them are very optimistic; some of them bring a large sense of optimism. And some of them bring some matter of concern. So always starting with optimism if we look at the growth of solar, look at the growth of various other technologies: wind, batteries, specifically lithium batteries as well as LED lights we can see that these technologies have significantly reduced in cost. There has been a significant increase in the deployment all across the globe, not only here in the United States but all across the globe. So that definitely is a matter of optimism.

And secondly if you look at the market pull, which obviously is going to be dictating how these new energy technologies do in the near future, as well as continuing over the next 10-20 years, there is a significant amount of market pull from the emerging world: from China, from India, from all of Africa where either the grid is patchy or the grid is absent. So they are moving directly from having no grid to adopting these technologies. So, these couple of points definitely make us all very proud and bring a sense of optimism.

But when we look at the need for capital—and I personally have heard some numbers which definitely amaze me—these run into trillions of dollars, and some number that has come into my attention is $90 trillion for us to reach the two degrees centigrade target set by legislators and set by the various governments at COP 21. So when we look at the amount of capital that is needed, the amount of financial capital that is needed to reach—to develop

technologies to reach these targets that's very daunting. That's definitely a matter of concern.

And secondly, if we look at the amount of investment that's going into clean energy most of it is going towards deployment. And innovation is—I wouldn't say taking a backseat, but as you will see in the webinar and see in this presentation the amount of resources being spent, being devoted towards early stage R&D or towards innovation is not as much as one needs it to be for reaching these targets set for combatting climate change.

So these couple of matters of concern—and there are various others but these are the predominant ones, that definitely is something as we move towards COP 22 as something we feel should be addressed both at COP 22 and subsequently on how the clean energy community can start working towards putting more capital towards innovation as well as other resources so that we could move towards other technologies beyond solar, beyond wind, beyond storage that can help us achieve the climate goals set by us.

So in my presentation the next slide that we have here is talking about what I call the Good, and using the old Hollywood movie, "Good, Bad and Ugly" I have broken my presentation into these three phases, or into three segments, the good, bad and ugly. What we see here essentially is the deployment, or the growth in deployment of these four technologies: solar, wind, lithium batteries as well as LED lights. And if you look at the costs for each of these technologies that definitely has been a great achievement. In the case of solar, as you see, costs have come down significantly and so has the deployment. Similarly with—not getting into each technology, but we have seen that over the last ten years the progress has been immense and deployment, as I said earlier, continues to increase globally. So that definitely is a matter of—or it gives us a sense of pride.

Then the next slide we have just added some more details specific to solar and to wind. And if you look at solar, moving from 2014 to 2015, the investment has gone up by about roughly 15 to 18 percent. But the deployment has gone up significantly. So that definitely is due to the fact that the cost of solar has come down a lot more than we had anticipated. So the increase in investment is not linear as one would have expected. And this is continued—we do not have the numbers for 2016 as yet but the early number that we had seen in 2016, the trend seems to continue that the investment is not less than in terms of percentage compared to the increase in deployment. Similarly the case with wind. And again, the cost of wind or installation for wind farms or for wind turbines has come down exponentially and that has added on to an increase in the deployment that we see across the globe.

Now this is a slide which I share all the time, especially with naysayers. And what I mean by naysayers is people who have time and again said that the cost—when the cost of oil comes down, the cost of crude comes down the investment in renewable energy is going to be dropping. But when you look at these numbers, we definitely defy that law of physics. And that definitely is not an established law of physics, so I'm being sarcastic when I say that. But you can see that the cost of crude coming down has had no impact on the

amount of investment that has gone into renewable energy. And just a little, I would like to add, a correction to this slide, the last number that you see for 2015 is actually $348 billion. So there was a note sent out by Bloomberg that there was some error in their reporting of the total investments that went into renewable space, so the correct number is $348 billion in 2015.

Moving on to the next slide—this is where I would say moving from the good to the bad. And this is the global venture and private equity investment that has gone into clean energy. And as you can see, there has been a steady decline going from 2008—obviously, there were the macroeconomic conditions in 2008. But various other factors where we saw the financial market freezing up and that had a significant impact on venture capital and private equity financing for especially clean energy or for clean energy technologies.

So this definitely is a huge matter of concern that we pretty much reduce by 50 percent as far as early stage funding is concerned, or funding from venture capitalists and private equity firms.

Now if that was bad this is ugly because as you can we've gone, in terms of early stage investments we have declined from 2007 to 2014-2015 by about 85 decline. And impact of this is obviously felt a lot in innovation because when we talk about innovation yes, we have the governments in various nations doing the heavy lifting in regards of early stage, but there has always been the notion that there would be private sector financing, especially from venture capital sector to finance early *[audio break]*.

But when we start seeing an exponential decline of the sort that you see on the graph here, which is anywhere from 80 percent to 85-90 percent, that definitely impacts on a very negative scale the innovation that's going on in our labs. Plus, the commercialization of these technologies that have been developed, moving them out of the lab into the commercial marketplace.

So this definitely is, as you will understand, I started saying that it's a matter of concern that innovation is starting to take a little bit of a backseat. And this chart here, these numbers will testify that this is the case that we really need to, when we meet in Marrakesh, when we have the global leaders convening in Marrakesh, understanding why this has happened and getting to the root cause, plus more than just the root cause, coming up with a strategy on how we can engage the venture capital and the private equity community all across the world to start looking at, to start investing in clean energy technologies should be the main theme at COP 22.

This is a very well used chart, very well discussed chart on everybody talks about the Cleantech Valley of Death. And this is not just very unique to clean tech; in the past we have seen back at the turn of the century we saw this with B2B, with a lot of the internet commerce companies, or what they call e-commerce companies that are basically constituting the unicorns of today. But back almost 15-16 years ago we saw them going through the Valley of Death.

But if you see here that there are two valleys of death—and keeping in perspective the previous slide where we saw the steep decline in venture capital and private equity financing at early stage. If you look at this chart the primary concern that I have is that the first Valley of Death where VCs, or venture capital firms, and angel investors are supposed to be the predominant source of financing. And with that going away essentially the two Valleys of Death that you see on this chart can essentially become one. And the ripple effect is that essentially innovation will suffer. But with innovation suffering technologies that are very critical, very crucial for us to achieve the climate goals, the climate target that we have set for ourselves will not be seeing the mainstream market.

And using the language of investors, essentially the pipeline will dry up. And with the pipeline drying up, as you all are pretty much aware, that we will have a much tougher time in meeting the targets of cost, performance, reliability, durability and various other parameters that are very essential for the clean energy technologies of today, for them to reach the commercial marketplace.

So this is—keeping this chart as our common theme we need to see how we can start addressing the first Valley of Death, and we will definitely see a ripple effect where the second Valley of Death essentially will in itself be corrected. So this basically forms the main thesis of how we are seeing the drying up of financing for early stage clean energy technology.

What role does my employer, or Department of Energy, play in the grand scheme of things? Well, DOE definitely remains the largest funder of early stage clean energy technologies. And if you look across the S curve, we started very, very early stage. We start at what we call discovery science, where essentially we have some idea, some concept in the brain of a scientist at one of our 70 national labs, or at universities, which we continue to fund, or the idea that we continue to fund at universities. And this research is funded through our office of science, through our office of basic science. And as we move up what we call the TRL curve, or the technology readiness level curve we have other sources of financing, for example our applied energy office that has a budget of nearly $2 billion, or ARPA-E that has an annual budget of $300 million.

And these entities are essentially funding anywhere from TRL of 1 to 2 and ensuring that the technologies are able to march up to about TRL 4, TRL 5. And typically, or traditionally, we have seen that at TRL 4, TRL 5 there have been interest for early investors, whether they are angel investors or early stage VCs. But that is—if you recall the previous chart, that is where the financing from the financial sector has been freezing up.

Moving on from that stage, from TRL 4, TRL 5 we get to a point where the technologies get to an engineering prototype or a field prototype and the level of financing that needs to be brought in obviously increases. And our loan program offers essentially—has a mandate where they're sitting currently on a portfolio of about $30 billion and a forward authority of nearly that amount. And their mandate is to fund the first of its kind deployment of a technology

here in the United States, and obviously, there has to be the novelty of the technology in terms of its uniqueness and its economic benefits in terms of creating jobs.

So the key purpose of having the loan program office provide either a loan guarantee or a direct loan is that it gets the technology ready for mainstream where the first institutional financing in the form of a loan from a bank or from a private equity firm or in terms of a growth equity firm could start looking at the technology.

So that is basically the S curve where the Department of Energy is playing a key role. And obviously with the mission innovation where our objective is to double our financing, double our funding over the next five years, obviously each of these program offices is going to see a major lift in their budget and obviously in the amount of financing that they can provide for both early stage as well as mid-stage and late-stage technologies.

So coming back to Paris—as I said, Paris clearly was a very historic event where, as you see in the slide here, quite a few known names from the various governments around the world as well as you recognize Bill Gates standing there with the global leaders. And the commitment of mission innovation where at that time there were 20 nations; now I think my understanding it's about 23 nations that have committed to double their funding for early stage clean energy technologies. And complementary to that has been the commitment from Breakthrough Energy Coalition led by Bill Gates performing a fund to finance early-stage, mid-stage as well as late-stage technologies?

And not only has this dual function been very beneficial for clean energy technologies but it has provided a great impetus to a lot of other investors, investors who have been sitting on the sidelines and watching clean energy technologies. This has been a validation that the various nations around the world, and global leaders from the private sector like Bill Gates are putting money where their mouth is. So we have seen, over the last one year, quite a few private sector investors coming and talking to us about their interest in either raising new funds dedicated to clean energy, or increasing the amount of financing from their existing funds.

So all that is music to our ears, but a lot is to be still seen to be executed on how this is really going to be impacting what we really want to see in terms of technology coming out of the labs and coming into the commercial mainstream.

And as far as our role, the Clean Energy Investment Center, I think Eric provided a very good introduction to what we do. But the Clean Energy Investment Center is essentially a bridge between the U.S. Department of Energy and the private sector investor community. And we have several objectives or several mandates to follow up our mission.

The first one is what we call the lab partnering service. This is an online portal, and the first of its kind which connects the outside world with the

subject matter experts in pretty much all *[audio static]* technologies that are existing in the world of clean energy. And these subject matter experts decide at our 70 national labs. So this LINKS type of model is going to be very critical for having a seamless connection between not only the investors and private sector folks but the general public who want to connect with these subject matter experts to understand the risk of any technology or the marketability or even the "investability" of any and every technology that exists under the umbrella of clean energy technologies.

I jump from LINKS and innovation interface directly to project data initiative because that is another online portal that my team is very busy and trying to get a lot into the market possibly in the next few months. And just to give a few words on the project data initiative that's an online portal that would have a summary of all technologies that have been funded or have had assets touched in some form or fashion by Department of Energy.

We obviously fund hundreds if not thousands of project on an annual basis. So it was felt that we should have a summary of these projects, especially in the format that would be easily readable and understandable by investors. So it would explain the technology in a very succinct manner. It would explain the risk associated with the technology and the challenges both in the technologies that have been addressed and what challenges that remain for it to become a commercial play.

So these are two products that my team is looking to get out in the commercial marketplace pretty soon, the lab partnering service sooner than the project data. But other services that CEIC has been offering so far is more of a direct engagement with the private sector, especially with the investor community.

One of them is LINKS, and so far, we've had three links: two in Silicon Valley, one in New York, and these are essentially roundtable meetings where we have different team at each of these meetings and we invite investors to participate and we invite folks from our labs. And as I said earlier, the theme varies from meeting each LINKS. And there has been a very significant feedback, a very fruitful feedback both from the investors as well as from the labs. And that feedback is resulting into a report which my team here is in the process of finalizing and we will be releasing this report at COP 21 in Marrakesh.

Now aside from the LINKS we've had a couple of global roundtables, one in London and another one in New Delhi in the month of September. And again, the format was very similar to LINKS where we had investors, we had researchers, we had technologists and we had startup companies. And the forum was essentially to discuss various themes, for example to discuss the challenges that the startups see in raising financing, or the challenges that the investors see when they are evaluating technologies coming from either startups or from labs.

And another similar roundtable which we hold here at the Department of Energy—and this was, again, pioneered by Clean Energy Investment Center,

is I2, or Innovation Interface, where we have had a lot of interest and requests from the private sector community, as well as some of the investor community. So we invite a particular group and we seek information from them as to which particular technology is of interest to them, or technologies. And then we get our program offices catering to that particular technology in front of the private sector or investor folks who then meet with them over a period of two, three hours, or half a day. And the net result of that is a very good exchange of information between the two groups, between the investors as well as our program officers.

That has really helped both these communities in alleviating the risks or the questions around risks and challenges that have been seen so far, but also in addressing pathways on how Department of Energy's program officers could work more closely with the private sector and the investor community.

And last but not the least is technical assistance. And as I said earlier, my team is working on putting together a report, or a report which we are going to be announcing here at Marrakesh. And that report has feedback from all our engagement so far as well as recommendations and proposed next steps that we've heard from the investor and the private sector community.

So with that that's essentially the end of my presentation and love to answer questions from the audience.

Eric Great. Thank you very much. Fantastic background on the Clean Energy Investment Center. We have some good questions coming in.

The first one asks if you could expand a little bit on how COP 21, the Paris Agreement, has impacted your work and if there are any changes in program goals or timelines that you've seen, and if you expect more international R&D collaboration and investment stemming from the agreement.

Sanjiv Look, if the COP 21 Paris Agreement had not happened I would not have been working here. So I would say that that's directly impacted my being employed here. I mean the Clean Energy Investment Center was definitely—all of the Clean Energy Investment Initiative which was announced by the White House by Vice President Biden back in June of 2015. But leading up to COP 21 it was felt by a select team of folks and some of those folks are part of my team here, namely Ken Austin, who worked for almost six to seven months in putting together the whole concept, the whole DNA behind Clean Energy Investment Center.

So I would say the theme of the Paris Agreement was would it be possible for Department of Energy to engage with the investor community. And as I said earlier in my presentation, that has been the key objective that has been the key mission of the Clean Energy Investment Center as far as putting together a platform where we could engage more intimately with the private sector and the investor community.

Now I think Eric your second question was has there been any change in the program goals or timelines that you have seen. Well, in terms of the

timelines, it's always a work in progress and there have been significant progress since the Clean Energy Investment Center came into being which was early part of this year in January when I joined. I was employee number one. And there is a lot of progress, as you saw, in terms of deliverables that the Clean Energy Investment Center is looking at putting out.

But in terms of doubling of the R&D pretty much all the departments or all the program offices, including ARPA-E, including the CFO's office, Office of Science, etc., have been working around the clock in making sure that we have a very credible budget which would adhere to the timelines set by Paris, by the Paris Agreement, and meeting the doubling goals.

In terms of international collaboration, definitely I would say that the world is very flat, according to Thomas Friedman here, and my team and I we have traveled to various countries, we have given presentations. We've had meetings in U.K., in India, in Korea, Japan, Taiwan, South Africa. So we have met with the representatives of ministries of energy, ministries of commerce, etc. from all of these nations. And there are a lot of ongoing discussions which we want to take to Marrakesh in terms of how there could be cooperation with our national labs, in cooperation with DOE so that we could meet the targets set by Paris.

And in terms of how can we promote this I would say that the platform that we have put together in terms of these lab partner services, in terms of project data initiative as well as the roundtables, these direct engagements that we have through LINKS, etc., I think these are platforms that would facilitate, that would enable very good dialog between DOE and various partners around the mission innovation club.

Eric Thank you. A brief follow-up to that is what countries do you think are leaders in clean tech, attracting clean tech investment and what can we learn from them? You mentioned a few just then. If you could elaborate.

Sanjiv I mentioned a few names but those are the countries that we have met with. There were conferences, seminars that were set up at these countries. And one of the forums I forgot to mention which Clean Energy Investment Center held on the sidelines of MI SEM in San Francisco in late May, early June where we met with the energy leaders and we had representatives from the 20 countries as well as we had a group of investors at that forum.

But that set the stage for a lot of the countries who approached us, whether it was Korea or India or the others and they went ahead and set up conferences where we were invited to give keynote talks, etc.

But I would say that pretty much all the *[audio break]* are playing a very significant role in closing the gap and in promoting clean tech investment. So it's a lesson that we all are learning from essentially each other.

Eric Great. Thank you very much.

Next question is about early stage investment and if you're working with or seeing software or data management solutions that are either intended to spur or support renewable energy projects that are supported at an early stage.

Sanjiv Eric, let me just repeat the question to make sure I understand it. You're saying if there are any software projects that are being—or software-related projects that are being financed or funded for early stage clean energy, was that the question?

Eric Yeah, software or data management that are being supported at an early stage, yes.

Sanjiv Off the top of my head, I cannot think of any projects, but definitely, there are a few of those that I can possible think about. For example data for grid optimization, for grid modernization. That definitely is a technology or a project that has come to our attention. And we held a LINKS session in San Francisco sometime in the month of August, I think, which was in conjunction with our Office of Electricity. And the theme at that LINKS was pretty much focused on grid optimization and grid storage.

So during that LINKS we definitely heard from some of the leaders in the private sector community, from the private industry about the work that they are doing in getting funded as far as the data management or data analytics for grid optimization, grid modernization is concerned. So that definitely is an area of interest from the private sector and the investor community.

Eric Thank you.

The next question is about which types of investors are you getting traction with or getting the most interest from. If you can describe in a little bit more detail what types of investor entities that you've been working with or have been in touch with.

Sanjiv We are working across a wide area of investors. We have definitely worked with VCs; however, there are not a whole lot of VCs looking at this space but that number is definitely starting to grow again. We have worked a lot with corporate venture capital firms, or commonly referred to as “strategics”. And they typically have been financing technologies at a readiness level of about five or six once there is an engineering prototype ready.

Then we worked with angel investors and there are quite a few groups of angel investors who are looking at early stage technologies and some of them are actually working very closely with our national labs.

Then we have engaged a lot with “philanthropics”, in terms of family offices, foundations, some endowments also. The challenge that community has had is they do not have a platform of understanding technology risk and market risk as far as clean energy technologies is concerned. Given that there are quite a few verticals within clean energy technology if you're talking storage, if you're talking generation, if you're talking energy efficiency or transportation.

So we have worked extensively in demystifying each of those verticals and working very closely with the philanthropic community. Essentially, that report that we've talked about will capture a lot of understanding about the risks associated with each of these technologies *[audio glitch]* will be very valuable for the philanthropic community.

Then we've had interaction with investors who are traditionally called limited partners or fund of funds. These are large pension funds or university endowments who have been of late looking at direct investments but traditionally these are the folks who have been putting capital to use through *[audio glitch]* from the private equity firms. So we've had interaction with them, and again, the discussion has centered around the technology risk and how DOE can play a role in mitigating the technology risk and having them understand the technology risk as well as market risk and scale-up risk

how does one go from a lab prototype to engineering to field to production, which obviously there's a significant scale-up risk. And a lot of the investors have been very eager to understand DOE's role in the scale-up aspect of taking a technology from the lab through the commercial doorstep. So that has been our engagement in terms of the various segments of investors looking at clean energy technologies.

Eric Thank you. That was very helpful.

The next question is about the project data initiative database. If you could expand a bit more on how you think it will be used and how you expect it to evolve over time.

Sanjiv Sure. As I have indicated earlier DOE funds—I don't have an exact number but hundreds of projects an annual basis, maybe even thousands. That's some number I should look up to see how many projects we actually fund on an annual basis.

But a lot of these projects are for very early stage technologies. I would say a majority of them are for early stage technologies either through our labs or through our applied energy offices, our program offices that are funding universities or funding small or large companies.

So the project data initiative the mission was I would say the focus of project data initiative was to capture the progress of these projects over a period of time while they have been funded by DOE. So the thought was to capture this in an executive summary, something that a lot of investors would like to see. And a typical executive summary is about one page long. And it captures a very brief statement about the technology, the technology challenge that has been addressed and the market that the technology is looking to address. And also in terms of the risks that have already been addressed and the risks that need to be addressed.

So the thought process was that using the online portal if an investor was interested in a particular technology—we talked about storage. So let's take an example of storage. If a particular investor or group of investors were interested in storage, they would go to the online portal and type in energy

storage. Or if they want to be more specific, they can type in lithium batteries or flow batteries or whatever the case might be and they would get a list of the projects that have been funded by DOE. And that's going to be over a period of time. So obviously we're not going to go back 10 or 20 years, it's going to be starting from the last two, three, five years. So that way they can have a direct access to these executive summaries that will give them information in a very readable format about a particular technology, and from there onwards they'll have the contact information of the entity also. So from there onwards they can contact the entity and start their dialog how they can engage. But that has been the main theme of project data.

Eric Thank you. The next question is about the VC funding, the ugly part out of that series. If there's any silver lining in there with the VC funding that remains what projects that might still be managing to secure funding.

Sanjiv That's my favorite slide, by the way, Eric. There's a huge silver lining because when everybody has left that's when you start digging for gold and you definitely will find gold. And so there is, as I said earlier, if we looked at about a year ago or a couple of years ago the number of VCs, early stage investors—angels, etc., had really diminished. But we are starting to see a lot more interest, and in our constant engagement with the investor community, we have heard from investors all across the globe that essentially services like the project data initiative, like the lab partnering services, etc., are going to be very crucial when VCs start looking at early stage technologies.

So in terms of what they are looking at today there's a significant amount of interest in energy storage technologies. Everyone understands that for solar, for wind, for all these other power generating technologies *[audio glitch]* for them to be successful, whether we are talking here in the United States or we are talking energy access in Africa or any other part of the world storage is the crucial part of that equation. So I would say that early stage investors are very diligently looking at energy storage technologies.

And complementary to energy storage technologies everyone talks about energy storage; it's just not—just to demystify that I would say that is not just a set of batteries. There is a complete supporting system behind it, whether it's the power electronics, whether it is the controls, which is part of our electronics or the battery management system which is very crucial for enhancing the life of the battery, or other controls that are used for a particular application where the storage is used either as backup or it's used for demand response, etc.

So investors are looking very closely at various battery chemistries as well as looking at these supporting systems or supporting subsystems that form the complete energy storage system including electronics and BMS, etc. So I think that's a very long answer to what's considered hot by investors today but we can go on and on and on but aside from that energy efficiency for buildings is of a lot of interest to investors today also. But there's a whole list that the Clean Energy Investment Center is putting together and we definitely will have that as a second report sometime in the early part of next year.

Eric Fantastic. Next question is about eligibility criteria for getting funded and partnering, if you could expand a bit about that. And another related question is if you could talk about the loan portfolio and how that operates, the $32 billion loan portfolio.

Sanjiv Eric, if you don't mind could you repeat the first question please?

Eric Yeah, the first question is just about eligibility criteria for getting funded in terms of types of projects or where companies are based, for example, if you could speak to that a little bit.

Sanjiv I think that question is specific to Department of Energy. In terms of eligibility, various program offices work pretty much with any and every entity that approaches them, and they have their own set of eligibility. Now can foreign companies apply for certain funding programs? Yes, they can. There are stipulations that they need to partner with a U.S. entity or they need to have a U.S. entity as a subsidiary, etc. So it's very specific to each program office. So I would strongly encourage anyone who has an interest in any particular technology and wants to work with DOE to approach either us through our email, which is on the last slide, the Clean Energy Investment Center email, and we can guide them to the relevant program office.

And in terms of the loan program office, again, would be happy to connect folks who have interest in working with the LPO, or the loan program office. And our team, the Clean Energy Investment Center team can definitely make that connection.

Eric Great. Thank you.

With that, I think we'd like to turn to any closing remarks you'd like to make, Dr. Malhotra, before we go to a survey.

Sanjiv Sure. No, I'll tell you, Eric and Stephanie, this has been really good because through your services I really appreciate that you guys have been able *[audio break]* a very wide audience. And as a prelude to mention this a few times but as a prelude to COP 22 in Marrakesh where I'll be there and we are holding a roundtable with some investors and energy leaders from the various mission innovation countries. And this will be chaired by our secretary, by Dr. Ernie Moniz. I think this is a really good step to Marrakesh and really look forward to engaging folks from the audience in Marrakesh if they happen to be attending there. So thanks again.

Eric Great. Thank you as well. That was a really great presentation and a very informative question and answer session.

We'll turn to the survey now, quickly, five quick questions for our audience.

The first question is, “the webinar content provided me with useful information and insight.”

The next one is, “The webinar's presenters were effective”.

"Overall, the webinar met my expectations."

"Do you anticipate using the information presented in this webinar directly in your work and/or organization?"

And finally, “Do you anticipate applying the information presented to develop or revise policies or programs in your country of focus?”

Thank you for answering our survey.

On behalf of the Clean Energy Solutions Center, I'd like to extend another thanks to Dr. Malhotra and to our attendees for participating in today's webinar. We had a terrific audience and we very much appreciate your time. I invite our attendees to check the Solutions Center website if you'd like to view the slides and listen to a recording of today's presentation as well as previously held webinars. Additionally you'll find information on upcoming webinars and other training events. We are now posting webinar recordings to the Clean Energy Solutions Center YouTube channel, and please allow about one week for the audio recording to be posted.

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 in future Clean Energy Solutions Center events. This concludes our webinar.