

Vietnam: Corporate Renewable Energy Update

—Transcript of a webinar offered by the Clean Energy Solutions Center on 16 April 2019—
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Webinar Panelists

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Rob Hi, everyone. All right. Let's get started. Hopefully we've enough time for folks to join in and log in here. Hi, everyone, I am Rob Hardison, and welcome to today's webinar. It will be hosted by the Clean Energy Solutions Center in partnership with the Clean Energy Investment Accelerator. Today's webinar is titled "Vietnam: Corporate Renewable Energy Update."

Before we begin I have a few housekeeping items. If you can hear me, you're probably doing just fine with the audio, but if at any time during the presentation you have any problems, you can switch over to telephone mode. You can see on the right-hand side there there's an option for selecting the telephone button, which will display a phone number and a PIN for you to be able to call into. During the presentations the audience microphones will be muted to avoid kind of having background noise. There is a section where you can add—you can post questions that will be passed over to the presenters. If at any time during the presentation you have any problems with the administration functions of the webinar, you can put them in the chat panel. I'll try to get to those as they come in.

Today's audio recording and presentations will be posted to the Solutions Center training page within a few days of the broadcast and will be added to the Solutions Center YouTube channel, where you can find other informative

webinars as well as video interviews with thought leaders on clean energy policy topics.

Finally, one important note of mention before we begin our 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 practice resources reviewed and selected by technical experts.

Today's webinar will focus on Vietnam's rooftop solar PV market and the shifting regulatory environment for commercial and industrial energy users, as well as updates regarding the direct power purchase agreement, also known as the DPPA pilot program, which will be led by US Agencies for International Development's Vietnam Low Energy Emission—Low Emissions Energy Program, also known as V-LEEP.

Before we jump into the presentations, I'll provide a quick overview of the Clean Energy Solutions Center, who's hosting today's event. We will have two presentation sessions. Each one will have a separate Q&A section, but any questions that you put into the question and answer box we can consolidate and get them to the correct presenter.

The Solutions Center was launched in 2011 under the Clean Energy Ministerial. The Clean Energy Ministerial is a high-level global forum to promote policies and programs that advance clean energy technology, to share lessons learned and best practices, and to encourage the transition to a global clean energy economy. Twenty-four countries in the European Commission are members contributing to 90 per cent of the clean energy investment and responsible for 75 per cent of the global greenhouse gas emissions.

The Solutions Center focuses on helping government policymakers design and adopt policies and programs that support the deployment of clean energy technologies. This is accomplished through support and crafting and implementing policies relating to energy access, no-cost expert policy assistance, and peer-to-peer learning and training tools such as this webinar. The Clean Energy Solutions Center is cosponsored by governments of Australia, Sweden, and the United States.

The Solutions Center is an international initiative that works with more than 35 international partners across a suite of different programs. Several of the partners are listed above including resource organizations like IRENA, IEA, and programs like SEforALL, and the regionally focused entities such as ECOWS Center for Renewable Energy and Energy Efficiency.

One of the key features the Solutions Center provides is providing a no-cost expert policy assistance program known as Ask an Expert. The Ask an Expert services matches policymakers with one or more than 60 global experts selected as authoritative leaders on specific clean energy finance and policy topics—excuse me. For example, in the area of distributed generation we are very pleased to have Toby Couture, founder and director of E3 Analytics

serving as one of our experts. If you have a need for policy assistance in renewable energy or any other clean energy sector, we encourage you to use this valuable service. Again, the assistance is provided free of charge and it's available through the Clean Energy Solutions webpage.

For today's presentation we'll have three presenters. The first is Evan Scandling, who is the Co-Lead for Southeast Asia for the CEIA program, which is the Clean Energy Investment Accelerator program. Evan has more than a decade of experience advising, developing, and managing clean energy businesses, projects, and programs around the world. He's based in Southeast Asia and has been since 2012, and he has primarily focused on on- and off-grid decentralized solar PV in the Mekong region.

In his current role with Allotrope Partners, Evan co-leads the Clean Energy Investment Accelerator program in Southeast Asia. He also contributes to Allotrope's other advisory work in the region with an emphasis on commercial and industrial renewable energy strategy and implementation. Prior to joining Allotrope, Evan was the Myanmar country director of a regional solar project developer.

Following Evan we'll hear from Dr. Quynh Chi Trinh. Chi is an expert on renewable energy and power markets in Vietnam. Before joining the CEIA she provided policy and regulatory advisory services to Vietnam's Ministry of Industry and Trade on Renewable Energy market development for GIZ. Chi holds a Ph.D. in electrical engineering from the Catholic University Leuven in Belgium, a Master of Science in economics, technology and territory from the University of Paris-South in Paris, and a Master of Science in engineering and policy analysis from Delft University of Technology in the Netherlands.

Following Chi, our final speaker will be Gary Zieff. Gary is a renewable energy expert with over 18 years of experience in emerging and established energy markets. He is currently based in Vietnam where he leads private sector engagement to improve access to finance and development expertise for Vietnamese renewable energy developers. Gary's prior experience includes work in the Caribbean, East Africa, Eastern Europe, and Southeast Asia. He has developed and implemented an investment strategy for a portfolio of 100 megawatts of third party-owned commercial and industrial PV projects, led business development for an engineering procurement and construction company, and managed large portfolios of investor-owned PV assets.

With those introductions I'd like to welcome Evan Scandling to the webinar. Let me pass things over to him. There you go, Evan. Let's make sure you're unmuted.

Evan

Okay. Thank you very much, Rob. I'll fire up my screen here, make sure everyone can see it.

So, to kick things off—and as a reminder, Dr. Chi and I will be covering the rooftop solar aspect and then Gary will be taking over the DPPA. But to put things in context in terms of why we're holding this webinar today, really the

thought was—for a bit of background, for those of you kind of joining in from outside of Vietnam—we over the last 15, 16 months with the CEIA program in partnership with the USAID V-LEEP program have been hosting a renewable energy buyers working group in Ho Chi Minh City on a regular basis. So, we had our most recent group in Ho Chi Minh on March 19th and covered many of these topics. So, if you joined that March 19th working group in Ho Chi Minh City, some of this will be a repeat.

But really, the purpose of this webinar is to reach some of you that are perhaps sitting regionally in Southeast Asia or even further abroad that are engaged in Vietnam. And really, the main idea, the main impetus for this webinar, the timeliness is that, as you'll hopefully see, the regulatory landscape for solar and particularly rooftop solar is evolving and changing quite rapidly, almost month to month or even week to week.

So, with that, Rob did provide a bit of background on the CEIA program, but to provide a bit more the CEIA program, it's worth highlighting is led—co-led by three partners. It's a private—public-private partnership between the World Resources Institute, Allotrope Partners, who I work for, and then the U.S. National Renewable Energy Laboratory. We come together and work right now in five different emerging markets, Vietnam being the one that we're focused on today, but we also focus on corporate clean energy renewable issues in Indonesia, Philippines within this region, as well as Mexico and Colombia. We have a variety of different activities, which I'll come to in the next slide, but it's worth highlighting that we are supported by a variety of different organizations and funders, including the US government, the German government, P4G, which is backed by the Danish government. So, really, the main point here is that we're working with a variety of different supporters to help us hopefully see some acceleration of large amounts of clean energy being used by the private sector in these key markets that we've targeted.

In terms of how we're—the CEIA program is doing that, particularly in Vietnam, there's three main areas. One is where we engage the markets widely—that would be that first bullet point there, the "dialogue and engagement." And if you're—have been based in Vietnam or we've communicated, that would be the renewable energy buyers working group that we've hosted in Ho Chi Minh City on a reoccurring basis. And the idea of that is to engage both the buyer side, the corporate energy users that are seeking more information and are interested in advancing clean energy at their facilities in Vietnam, as well as the investor and developer side that are developing those renewable energy projects.

Secondly, we have supported and continue to support the policy and regulatory development. Perhaps you have engaged with us in recent months, particularly on some of these policy and regulatory developments that have taken place in terms of providing a gateway for private sector feedback that—where we can help bring together the voice of both the corporate energy buyers as well as the developers and help funnel those voices back to the policymakers and hopefully end up with a conducive policy environment that

will allow for large energy users from the private sector to have increased and improved procurement options in clean energy. And ultimately, that's our main mission highlighted there on the bottom, where each of these activities that we're doing really feeds into the idea that we believe that the private sector, particularly large energy users from the commercial and industrial sectors, really have strong demand and strong buying power and that can help shift the country's overall energy mix if we really help the private sector move to using more renewable energy.

The last point I'll quickly go on here is that direct technical and transaction support—and it's worth highlighting if you were a corporate energy user in Vietnam and you have factories or large energy-using facilities and you're interested in proceeding or you're interested in investigating your clean energy options in Vietnam but you're not quite sure where to start, that's where also CEIA—that's where our team can help you and engage on a one-on-one basis. And in some cases we have gone through multi-month partnerships with renewable energy or corporate energy users to really start at step one with a feasibility study and go through the entire, as I say, A to Z process to help the buyer understand their options and opportunities for renewable energy, and then if they're interested actually move through a procurement. So, please don't hesitate to follow up with the CEIA team afterwards if that's something that you as a corporate energy user are interested in exploring further in Vietnam.

So, again, I think we already covered this. A quick reminder: I will spend about ten minutes looking at the recent market activity and updates, and then Dr. Quynh Chi will talk more about some of the barriers that we're still seeing and then looking forward at what to expect. And then, we'll follow that by 15—with 15 minutes of Q&A. And then, as mentioned, Gary will then take over with the Direct Power Purchase Agreement overview.

So, getting into the real content here, I think it's always worth, particularly for folks that are maybe not based in Vietnam either regionally or further abroad, really just first understanding where is Vietnam right now in terms of the power sector itself. So, some key ingredients here—I mean, number one is growth. I think that's a common theme here when we're talking about the power sector in Vietnam. Strong GDP growth in last—in the last years, and that's expected to continue. And that of course comes with increased electricity demand as well, and fairly significant at eight to ten per cent. And this eight to ten per cent is projected out at least for another decade, into 2030 or out to 2035.

So, that's driven largely by commercial and industrial: Those large energy users from the private sector are using significant quantities of that electricity. And an eye-opening statistic here I think is worth looking at if we're looking at Vietnam now and Vietnam over the next decade, we'll need to expand significantly—and this 50 gigawatts is roughly where Vietnam is today, and that 130 gigawatts is where, according to its power development plan, we'll need to have the installed power generation capacity within about 10 or 11 years, which as you can see is more than doubling its current capacity. And

ultimately, this is based on the current PDP and could shift. But in short, a large scale-up of power generation capacity resources are needed.

On top of that it is worth highlighting that Vietnam is also—in parallel with this demand increase there's also a risk that the government has highlighted in coming years and starting in 2021—so, not too far away—a risk of supply shortage. And that really, I think, is important when we're talking about distributed rooftop solar assets in which ultimately the government is looking to fill that supply gap. You know, 3.7, 10, and 12 billion kilowatt-hours annually is what is projected by the government in recent months. And so, ultimately, that last fact there, \$150 billion is projected of investment for both generation and transmission and distribution build-out in the next decade.

So, there's a significant opportunity from the private sector and particularly when we're looking at the supply shortage that really starts to make rooftop solar and other distributed generation assets and storage start to look very important and attractive in this market.

So, looking specifically at solar—oh, sorry, before I switch slides here it's also worth highlighting that Vietnam as a government is also in the midst of a multiyear transition of moving to a more open, retail-oriented, liberalized market. So, that's very important when we're looking at the policy shifts, we're looking at new mechanisms such as the Direct Power Purchase Agreement that are opening new pathways. This does fit within Vietnam's overall strategy of liberalizing its power market.

So, looking at solar as a whole before we really start to focus specifically on rooftop solar, very quickly it's quite clear that the solar resources are strong in Vietnam. The resources are stronger in the south, and that's what we've seen thus far both with utility-scale solar farms and rooftop solar. Most are concentrated in the central and southern areas. As Dr. Quynh Chi will come to in a few slides, we'll hear more about how the upcoming regulation and the feed-in tariff will—is geared towards incentivizing more investments and more projects in the north as well.

One other figure to mention here is if we look at where is Vietnam right now—this red line is approximately where we will be in the coming months—the short of it is that Vietnam is well ahead of schedule in terms of its targeted solar power development. As we see here in the original power development plan that the government had targeted approximately 850 megawatts by 2020 of solar, and that's both utility-scale and rooftop. What we're seeing now is if the projects that are slotted to reach commercial operation date by the end of this first feed-in tariff regulation, just in two months from now, at the end of June, we'll actually be closer to four gigawatts—so, well ahead of schedule.

So, in short here, the key message is that solar really has taken off in the last two years under the FIT program. Particularly, the majority of this is through utility-scale solar, but really the key here is that there's been strong investment, strong interest from both domestic and regional and international investors. In short, you could say it's a very hot market right now.

So, looking specifically at rooftop solar—and I won't spend too much time on this slide; I'll be happy to share it afterwards as there's a lot of details here. But really, just looking in the last few years up until now how the growth has taken place. But really, the first solar regulation for Vietnam was put into place about two years ago, and the key from this point here is in about a two-year span—this is up until the end of 2018—there were approximately 18 megawatts of rooftop solar across the country installed, and that's both commercial and industrial applications as well residential. And actually, the main market segments looking back were primarily households that were taking up solar.

There were a variety of issues that—you know, ultimately 18 megawatts is not a large number for a two-year window. There were some barriers and hurdles that were slowing down investments, some of them being ineffective payment of the net metering programs. A lot of gray areas, lack of clarity in terms of how well the tax treatments would be taken care of for that net metering payment, as well as some questions and lack of clarity in terms of connecting to the grid and whatnot. So the short is there was some good progress up until about December, but due to some lacking areas in terms of both the financial side, the payment side, and the technical side, we did not see the growth that probably some audience wanted to see.

Looking in the last few months, if we're looking at January 2019 through now and the next few months, I think we see a fairly striking difference. There has been essentially a fairly fast uptake of rooftop solar just in the last few months. We are now as of a few months ago already at 30-plus megawatts, and I think most industry participants here in Vietnam are expecting to see at least 50 megawatts of rooftop solar capacity installed by the first feed-in tariff net metering deadline at the end of June. So, a fairly quick update just in the short span of a few months here, and that's been more so driven by commercial and industrial, and a lot of that has been driven by some clarifications issued by the Ministry of Industry and Trade as well as some more guidelines issued by the Utility EVN. And Dr. Chi will cover some of those developments that have just really taken place starting in January, and several of those have taken place and started to provide some more clarity and some more insurance to those investors and to the customers to know that their investments will reap the rewards that they're planning for.

Now, if we look at—and it's worth highlighting as well, just in the last 6 months or perhaps 12 months leasing programs between third party investors have started to become more and more common, and we'll cover that a bit more in a few slides. But I think generally looking back two years ago, most rooftop solar customers were procuring their systems on a capital expense basis, a turnkey basis, whereas more so, particularly in the recent year or even six months more investors are coming in and offering financed options, primarily in the form of a lease. And that's—from that procurement option has really expanded the menu and opened up more opportunities for commercial and industrial customers.

Looking forward, as we expect on July 1 when the new solar regulation which is currently in draft form—it's worth underscoring that right now, and ultimately that's why we're having this webinar, that's why we had the Marshank team working group, is there is a draft solar regulation that has been issued by the government. But it is still just that, just the draft. And so, whatever we are discussing today is really still in draft form and we hope, the industry hopes to see a final version of that issued by the government here in the next one to two months. And that will really be this third window here of starting July 1, which essentially will provide the guidelines for rooftop solar and the wider solar industry, provide guidelines for the coming two years. And that will be quite a bit different than what we're seeing now with the first two years. There's some new components and that's what Dr. Quynh Chi will be covering as well.

Worth highlighting here—I mean, we've been talking a lot about the policy and regulatory aspects and that's what has been the main drivers, but also just in the last couple weeks industrial energy users—or, all energy users in Vietnam saw an increase from their rate of retail electricity rates. So, just as an example here, I think most of the people on this call here are probably from the industrial side, so if you are a manufacturer in Vietnam you're paying an industrial EVN rate, and for daylight hours—so, when the sun would be shining and producing solar electricity—the weighted average, there would be about a seven per cent increase in your EVN bills as of a couple weeks ago. So, that's worth highlighting. Obviously, if we're looking at alternative energy sources and the attractiveness of those alternative options, rooftop solar became a bit more attractive as the EVN retail tariffs went up, and that's expected to continue in coming years.

So, quickly here—again, I just wanted to use this as a visual, which Chi will come back to. But really, if you look just at all of this activity from the policy and regulatory standpoint in the last six months—and we'll talk about each one of these, but really, when we talk about "Wow, the rooftop solar industry is starting to see a lot of scale-up in the last three, four, five, six months," a lot of that is driven by these decisions and circulars and clarifications that have been issued, really to resolve some of those tax issues of the net metering, the net billing mechanism, resolving for example here just about three weeks ago the Utility EVN issued further guidelines in terms of the implementation of the rooftop solar projects. So, we're really starting to essentially see more detail and more clarity from the regulatory and policymakers, which then allows the private sector to work more quickly and execute their projects faster.

And as I mentioned, as we see in the red here, the first draft decision, second draft decision, this refers to the upcoming new solar regulation and that really leads to here, as we are all expecting by June, in the coming month to two months, a framework for the new 2.0, as we might call it, solar regulation that will guide the solar industry for the next coming years.

In terms of if you are a commercial energy buyer right now, commercial or industrial energy user, and you're looking at what are your options for rooftop

solar, it's fairly simple as of today. That will shift a little bit with some new models and some new options with that new solar regulations starting in July, which Dr. Quynh Chi will cover. But as of today, as we've seen until now, really, corporate buyers have had two primary options. One is they can choose to purchase the solar system on a turnkey basis. Obviously, that is a challenge oftentimes for a business where their core business is not in energy production. And oftentimes we see if a company has capital investment restrictions, if they need to see payback periods of two or three years or less, purchasing a solar system outright is not going to be an option for them.

So, there have been a good number of projects done on this basis, particularly in the earlier years before more leases were widely available. It's worth nothing, I think, a key feature of the Vietnam market here is that domestic Vietnamese banks are showing interest and are becoming involved, and we'll show a few slides of example projects here in a moment, but at this point accessing a loan, if you are a factory manager or any kind of commercial or industrial energy user, it's still not easy to go to a bank in Vietnam and get a loan. It's still a fairly new product, a fairly new area for the banks in Vietnam, and that's something that we're hopefully hoping to contribute to and improve, that in the coming years we can see more similar lending options that we might see in Thailand for now where banks are more familiar with rooftop solar assets and those loans are more widely available.

In lieu of that, though, what we've seen particularly in the last year is that OPEX-driven option in which the commercial or industrial energy user doesn't have to take on any capital expense on their balance sheet and is looking at a long-term lease. And I'll cover the features of what these leases generally look like in the coming slides, but oftentimes they are either built as a build-to-own/operate in which the outside investor, the solar company maintains the ownership of that asset for the lifetime of that contract, or in several cases that we've seen in the market there is an ownership transfer at the end of that leasing contract, what we might call a build-to-own-operate-and-transfer.

What we're looking at in the future, and why this is in a different color here, is the ability to do that true power purchase agreement in which the buyer and the seller, the commercial and industrial energy user, and the solar company can negotiate for a contract. On paper that comes down to the buying and selling of kilowatt hours from that solar asset. That's not the case as of today, but as things are looking both with the DPPA program, as Gary will talk more about, and as we believe may be the case in this upcoming draft regulation—of course, we have to see what the final regulation looks like. We believe a typical—as we've seen globally, an onsite rooftop solar PPA may be an option on the horizon here.

In terms of some of the typical features that we're seeing in the market in Vietnam—and this is based on our own experience engaging with the buyers and the sellers, so this is not a comprehensive, this is not based on a full survey of hundreds of market participants, but these are some features that we've seen on particular project-level bases. So, you as a buyer or a seller

might see different types of contracts other than what I'm talking about here, but I think this is a general—generally true for most types of contracts that you would see for rooftop solar contracts for commercial and industrial energy users.

So, it's worth highlighting, particularly if you are a buyer. If you are interested in an OPEX-oriented contract in which you do not have to invest any of your company's own money, generally you should be prepared to have a long-term contract, if it's a lease or a PPA in the future—in any case, usually that solar investor and owner is going to want to see a commitment from the off-taker side, from the customer side, for a fairly long term. It might be less than 15 years. I would say 15 to 25 years is a general rule of thumb. You may be able to get a contract for 12 years or 10 years. But ultimately, I think the general takeaway is that the longer the off-taker is willing to engage in an OPEX-oriented contract, in a lease contract, the better terms that you will be able to get as an energy user.

I think sometimes we lose sight of this, but particularly for new energy users that are investigating their options right now in Vietnam, "Can rooftop solar save me money?" I'm a factory owner or I'm operating a shopping center or an industrial park. Really, rooftop solar provides clean, green, renewable energy but can actually save money?" The short answer is, based on what we've seen on in the market, particularly in the last year with these leasing deals, is yes. Most of these contracts between the buyer and seller do provide an immediate savings, an immediate discount for the energy user. For the industrial rate payers, which is the majority of who we engage with—these are the factories and really any large energy user that's producing, has a production facility, they have a lower EVN rate, so that means the margin of savings is a bit lower compared to the commercial ratepayers, being shopping centers, hotels, nonmanufacturing sites.

But in short, it is worth highlighting it. And if you've attended any of our renewable energy buyers working groups, the key phrase that we've said time and time again is "Rooftop solar should be meeting or beating the prices that you see for EVN." So, that should be a key takeaway.

Ultimately, this is a representative example. There may be some cases in the market where rooftop solar buyers are paying a premium, particularly if they only agreed to a shorter-term leasing contract. And that goes back to my point of if an energy buyer is willing to engage in a longer-term contract with that solar vendor—15, 20, 25 years—there's a much stronger chance that you'll be able to get that immediate discount from your rooftop solar provider.

One thing—a bit of a pitch here from CEIA, and this is where we work with on a one-on-one basis with buyers, is we really encourage if you are an energy user operating a factory or an industrial zone, shopping center, and you are interested in learning about what the options are on the menu for you in terms of rooftop solar, we'd really encourage you to do an organized RFP and procurement process so you are able to see multiple quotes from solar vendors and see the different types, different flavors of options out there and really allow you to see all the different vendors—there's a variety of vendors

working in the market—and make sure that you get a full—see the full menu of options. So, again, please follow up with either myself or Dr. Quynh Chi, and if that's something that would be useful, we'd be happy to discuss that further.

Very quickly, two—we've been talking a bit in the clouds here in terms of the high level details but it's worth showing real projects are taking place on the ground in Vietnam, some fairly significant from a capacity standpoint. This first snapshot here is for an apparel manufacturer. It's an overseas manufacturer. They are a supplier of Adidas and probably some other global companies. One feature to note of this project here is that 999-kilowatt capacity, and that's worth mentioning, as Dr. Chi will cover here. Most projects have been at that one-megawatt peak threshold and below, and that's quite simply due to much more simple, streamlined permitting processing for the buyer and the developer when they were going through the processes with EVN and the government of Vietnam.

It's worth highlighting—and this is something that we discussed in our last renewable energy buyers working group—that is not a strict limit. You all—you as a rooftop solar investor can go above a one megawatt peak for rooftop solar, but the permitting processes will be more complex because you're required to enter your project into the national power development program. So, it is possible, but I think it remains to be seen to how much extra effort, how much time and extra money it requires to go beyond that one-megawatt peak capacity sizing.

It's also worth mentioning here on this slide: This is an example of a 20-year operating lease between the industrial energy user and the solar investor. One other feature of this project is that HD Bank, which is based—a Vietnamese bank, was a lender. And I think that's a good example here of banks in Vietnam starting to be interested and to provide some significant lending options to these fairly large projects.

Now, one other project that just came online in recent months is a European manufacturer, not—actually, just within the Ho Chi Minh City city limits. It's a 422-kilowatt peak for fully self-consumption. And again, this is worth noting that this is another strong example of a long-term lease between the buyer, which is noted as a European manufacturer, and in this case Cleantech Solar is a regional solar developer and investor. and this is something we aim to do for our future webinars, for our future working groups, is really to show that these projects show strong evidence for these projects moving forward.

With that, hopefully I've at least got the ball rolling here in terms of where the rooftop solar market has been moving in recent months, and then that will allow me a segue to pass over to Dr. Quynh Chi, and she'll highlight some of the barriers that still do remain. The picture is not completely rosy right now for rooftop solar. There are still some barriers. And then, she will also cover what to look at moving forward, particularly with the final decision that we all expect for the new solar regulation that is expected to go into place in July of this year.

So, with that I will put myself on mute and hand the baton over to Dr. Chi.

Quynh

Yeah. Thank you, Evan. Hi, everybody. I'm Quynh Chi, also from CEIA with Evan, based in Hanoi. And thank you all for your time today and attending our webinar summarizing the market of Vietnam solar rooftop and following by the DPPA by Gary from V-LEEP.

So, as Evan already showed you the picture of the projected movement in Vietnam, I would like to walk you through a different analysis of the market environment for solar rooftop in Vietnam only, focusing on the policy regulations—both existing regulations and then also the upcoming to expect.

So, let's first talk about the market environment. You can see from this slide and the data from Evan's talk that Vietnam up until now, or by the end of 2018, only have 18 megawatts of solar rooftop. The question is with the high potential and the needs or the high demand from the market, power from the market, why this limited—why this modest number has happened until the end of 2018, almost one and a half years after the support for solar rooftop, for solar power has been aligned, and there's not so many movement in the solar rooftop market.

So, basically, Vietnam is a new emerging market and has faced similar issues and barriers that all of the new markets are facing. And these barriers are coming from both legal and regulatory aspects, financial markets, and also technical—mainly coming from the lack of the regulations, lack of information, lack of experience. So, I will not go into every detail of this slide, but then I can highlight some of the key challenges that we heard from the market stakeholders, also from the—including the developers, including the corporate buyers, and even from EVN.

So, one of these I can point out here is the regulation that EVN is the sole buyer of the power market. So, by that it's limited the options and the possibilities for the direct purchase between the two parties in the market because every time EVN will have to be in the contract as the buyer. And also, another issue that EVN is also struggling with, with the current decisions and the current support mechanisms of rooftop solar, is unclear of the payment settlement. So, the current decisions are—regulate that the rooftop solar will be supported by the net metering schemes in which they don't separate between the consuming and the injection to the grid. So, this kind of net metering scheme creates a problem with the calculation for the tax. That is not approved and supported by the Ministry of Finance. So, that's why up until the end of 2018 the payment settlement for the solar rooftop injection to the grid is not clear, and EVN could not pay the rooftop solar generator for their power selling to EVN.

Another legal issue is that this kind of limited—or the unclear of the legal and the regulations lead to the difficulty with the financial and the market development. For example, if you don't—with kind of the unclear on the payment settlement, the limited information on the developments, et cetera, it's hindered—it's limited the information that the market stakeholders, including the buying and the financial institutions, to have good information

to make their decisions on investment into rooftop solar. Also, for the buyers, for the corporate buyers, potential buyers for the rooftop solar market in particular, they have limited knowledge on the market development, market experience—the market has limited experience and also limited good practice for the new potential buyers to look on and to support the investment decisions.

Also, from the technical side, even EVN and its subsidiaries, the PC, the provincial PCs, are struggling with the lack of technical guidance, technical standards on the implementation of the rooftop solar project and also the connection procedures, et cetera. So, there is several of the market barriers that hinder the development of the solar rooftop.

So far, luckily, the good news is these market barriers are kind of well perceived by the MYT or by the EVNs so that in the—starting from January 2019 we see a lot of activities and a lot of the legal documents coming out trying to solve several of the market barriers. So, as you can see in this timeline—and Evan has shown it before—within the one and a half years since April 2017 when the first decision came out until the end of 2018 there are only two main legal documents relating to the power rooftop solar market. But starting from January 2019 until now, April—only four months—you can see at least five significant documents issued giving a lot of changes and potential improvements for the market, among which decision #2 and circular #5—2019—have tackled the current existing barriers of net metering payment settlements. So, this is changing the net metering schemes on the existing mechanism to the net billing scheme with two separate cash flows, and therefore it allows taxation issues to be solved. And that's—based on that the EVN now could do the payments and do the settling for the rooftop solar power that they already received from the developers or from the investors.

For the technical side, EVN also issued a document 1532 to provide guidance on the technical concerns. And especially, you can see here with the two red documents, they are the two draft decisions showing that the government is working intensively on developing the new decisions, replacing the decision 11 in 2017, and to be effective from July 2019. So, draft versions of these new decisions are showing the efforts of removing legal regulatory barriers for the rooftop solar. And—for example, the key point that we can expect is that EVN will not be the sole buyer anymore.

And in the next slide I will highlight the key changes that we can expect for the solar market after June 2019 based on the two draft decisions having been issued by the government for public consultation. So, first of all, the biggest change is that now the solar power in Vietnam, we enjoy the zone FITs. So, it's not because of—as you can see in the map, the variation level countrywide is not the same. It's changing significantly from the north to the south, and accordingly the government has now divided the country into four zones, with the lower radiation zone enjoying the higher remuneration of the FIT levels. That kind of zone FITs will help to balance the solar rooftops and also the solar ground-mounted project developments nationwide, which is now the key—the hard issues in Vietnam, where every project developed in

the south is creating a lot of issues with the grid management and congestion issues.

And most importantly within the draft decision, we see that the government is now opening the door for more business models to the investors or to the developers. So, now the companies, the households interested in the rooftop solar investment can choose between several business models. Either they can self-consume first and the excess of the energy they can sell back to the grid, according to the net billing scheme, or they can sell—they can build the systems and then sell everything to the EVN under the buy-one-sell-one scheme. And more importantly—and this might be interesting to the corporate buyers—is that it's now possible to have the direct on-site PPA without using the EVN grid.

Several other things will now be changed. Again, it's that EVN is no longer the sole buyer and the billing remuneration. However, one of the key barriers is the one-megawatt peak of the solar rooftop projects is still the same. So, that means if you only consider as a rooftop solar project, if you are less than one-megawatt peak—above that size, the rooftop, even if the solar panel is attached to the roof, it would still be considered as a ground-mounted project. So, it has to go through owner FIT process for the licensing and the permitting as a ground-mounted project. And in Vietnam this is a very lengthy and complex process that makes a lot of investors and developers feeling tired and annoyed. Yeah.

So, that is a brief overview of the changing and the improvement we can expect in the next few months. And it will be effective after June 2019. With that kind of changes we are saying that there will be more solutions, more options for the corporate buyers to develop solar rooftops, so we can expect to have more rooftop solar projects with investors being involved with the buyers, corporate buyers. Also, with the direct PPA without EVN grid usage we can see more opportunity to develop solar rooftop and more interest to have rooftop solar projects within, for example, industrial zones. And thirdly, with these zone FITs we can look forward to seeing more rooftop solar in the north, rather than only in the south like now.

With that, I would like to conclude the CEIA overview on the rooftop solar market in Vietnam. In summary, we observe it is a potential market and becoming more and more attractive to the corporate energy users. However, the market environment is now in a sensitive period with a lot of movements and changes even within weeks. And this movement, this change is happening and is going to be expected within the short term, and that's why it's required close follow-ups from the interested players. At CEIA, with our mandate of supporting buyers, we'll do our best to get the buyers involved. Specifically, as Evan mentioned in the beginning, we quarterly organize the buyer working group in Ho Chi Minh City, and the next working group we plan to have in July upon the final decision of the _____. So, you are all kindly invited. And we hope to see more positive movement and development of the solar rooftop market in Vietnam. Thank you for listening. Back to Rob.

Rob

Thank you, Dr. Quynh Chi. I'll take this back over here. Thank you guys very much. Those were great, very informative presentations. We've got a couple of questions and answers—or, questions, and answers to come from those. We got a lot of great information there. We're a little bit over time in terms of what we were planning, so this is more likely to go for about an hour and a half, so about another half hour to go. So, we'll try to get through this first set of Q&A and then we'll bring Gary on and continue on from there.

So, the first set of questions that we have, we have a question around—let's see... Oh, one question was: "How does leasing differ from a PPA?" If there's anybody that could provide—I guess one of you could provide a little bit more detail on the difference between how a lease and a PPA presents itself to the market or actually comes into play.

Evan

Well, yeah, this is Evan. Thanks, Rob, and thank you for the question. The short answer is PPA is not an option at this point in Vietnam. So, the important point is right now if you are a corporate energy buyer and you do not want to invest, a lease is your only option. In the future, it is worth looking at comparing those options and that's probably worthy of an entire—another webinar session. But I think ultimately there are a lot of similarities. I think a lot of the developers based on what we've seen—again, anecdotally; this may not be true across the board—are framing their leasing agreements in very similar fashions to PPAs in which the monthly payment, the monthly leasing payment that that corporate energy user is in fact tied to the monthly solar production.

So, in function it is very similar, actually, to a PPA, but on paper in terms of actual contract between the buyer and seller it is framed as what we've seen in most cases either an operating lease or in some cases a financial lease. So, I think the easiest way to say it is developers have gone in with this goal of being able to sell solar on a kilowatt-hour—by kilowatt-hour basis, but in lieu of a PPA they've used a lease and tied it directly to the output of that asset.

So, I'll pause there. I think that would be worthy of another presentation to really compare. Let's—if we assume and hope that the new solar regulation does include the actual clear PPA—a true PPA option, we can cover that in coming webinar sessions or our buyers group to really talk through the menu from a corporate buyers perspective of how should a corporate buyer consider and compare a lease or a PPA and how do they differ? So, I'll pause there.

Rob

Great. Thanks. Okay, the next question we got was "Many industrial roofs provide an opportunity for over one megawatt of capacity to be installed for self-consumption. Considering the benefits for most stakeholders these types of projects can bring, what's being done or can be done to get a similar framework for these projects as is being discussed for one-megawatt and less rooftop projects?"

Quynh

Well—it's Quynh Chi—the issues on the cap of the solar rooftop project is actually a very hard question that we receive from the corporate buyers. Many of the corporate buyers in Vietnam are claiming that the one-megawatt peak is too little compared to the potential. And we already submitted to the MYT

with the request of the suggestion got increase the capacity cap to—even to a three-megawatt or even to a five-megawatt peak. But it's—actually, the cap is not only depending on the MYT but is also relating to the complicated issue with the planning that the government is dealing with. Recently, the Vietnamese government just issued a planning law which is trying to make kind of that the project has to be submitted and approved at the essential government levels. And that's why the MYT said if they increased the capacity cap to too high, then they would be strongly against—having a lot of objections from the other ministries and from the government relating to the planning issues.

We also understand that the corporate buyers, they have the case that they can use large amounts of the solar rooftop projects but then using it only for the self-consumption, not selling back for the FIT levels. But then, it is possible if you are not using the EVN grid. So, all kind of the "sorry about the capacity cap" is relating to the grid management and the issues of the planning. So, if you are not using the EVN grid, then you can do as you want. But I doubt that you can totally be off grid from EVN with a rooftop solar project larger than three megawatts, so that is still—yeah, you still need to follow the rule of the government.

Rob

Great. And I think here is a question following on to Evan's, is "Can we do operating leases, financial leases for one-megawatt-plus rooftop solar projects for self-consumption?"

Evan

I'll pick up there. I think Chi, Dr. Chi just answered that to some extent, and that's the main point being that if you're going to do anything over one megawatt, you—whether it's for self-consumption or not self-consumption, as we understand you will be required to enter that project into the national power development plan unless you can be completely off grid and not be using any EVN electricity, which would be nearly impossible for most manufacturers, most commercial energy—commercial and industry energy users in Vietnam.

So, theoretically, yes. In practice, it would be quite difficult. And I should note in terms of "Can you do an operating lease or a financial lease?" ultimately I would suggest that you talk to a law firm in Vietnam to get some more tangible specific advice about what you as an investor—perhaps you are a Vietnamese-based investor; you might have some different options versus if you are bringing your capital in from a different country. So, I'll pause there. But I think the short answer of that is that one-megawatt threshold still holds true whether it's for self-consumption or not and that there will be a significant amount of more permitting and procedures and in reality, waiting to have your project moved forward.

Quynh

I would like to add here that if you are over one megawatt then it's not like you are not allowed to do the rooftop solar project. It just means that you have to follow a long, lengthy process of the permitting and licensing. So, that will add up to the cost of the project development. But if you can go through this—like, for example, you have three or five megawatts, that the economics of scale is good in that, then—the process of permitting and

licensing is okay, it's worth it, then I think nothing—no one can stop you from developing a big project like this. Just be aware that you will have to follow one kind of the licensing and permitting process to see if it is still economical, an economical case for you.

Rob Great. Thank you guys both for those detailed questions, and thanks to the field for the questions. We—I guess in the interest of time, we've got a couple of extra questions that we can address offline and respond directly to the folks that have asked those questions, but I think we'll pass it on to Gary to get into the DPPA discussion. So, Gary, if we're there, best to unmute while I pass this over to you.

Gary I am still here.

Rob All right. And it should be—

Gary Excellent. Thank you Rob.

Rob on your way.

Gary Thank you, Evan. Thank you, Chi. Those were excellent, very informative presentations. Let's see if I can do this correctly. Is that working?

Rob Looks good.

Gary Awesome. Thank you, everybody, for joining the webinar. I'm excited to be here and share the DPPA. In the interest of time, since we would like to keep this to the allotted time I'll try to go through these slides carefully and concisely, and then if there's any follow-up questions or anything that anybody has any interest in learning more about, please feel free to e-mail me directly or contact me. I'm happy to share this information and include you in any future disbursements of information.

As Rob and Evan and Chi have mentioned, we're working on a direct power purchase agreement, a DPPA, and this is a new policy for Vietnam. And we're working quite closely with ERAV, the regulators, to put this into play. And the main participants that would benefit from this are going to be large industrial power consumers and investors—investors in renewable energy assets. We are working to put this into a pilot program which we hope to release at the end of this year. And again, I mentioned that it's currently focused on industrial power consumers and not necessarily commercial just yet.

So, I'll just go ahead and go into—we're going to talk a little bit about V-LEEP. I'll keep that really short and sweet. Then we'll talk about the program and the interactions between the participants in a DPPA mechanism, and then show some examples of what those financial operational arrangements look like so that you can get a sense of it.

V-LEEP is a five-year program funded by USAID. We are in the fourth of five years and we're working with public and private sector stakeholders to

create an enabling environment to allow and support the addition of renewable energy into the generated capacity of the Vietnam grid. Our direct counterpart is the Ministry of Industry and Trade, but for the DPPA program I work very closely with ERAV. In addition to that work we also work with developers, local developers to build renewable energy projects under the FIT program, and we're currently working with 11 project developers and a couple of banks. We believe hopefully five of those projects will get to COD by the deadline of June of this year.

There are three components to the V-LEEP program. The first component is really focused on policy. And of those two policies, or of those policies it's—one of them is supporting the government to review and analyze data and processes for the next PDP—PDPA. There's also a low emissions energy strategy, a renewable energy strategy for the government to consider and understand how to incorporate more renewable energy into the generation mix.

V-LEEP component two, which is, as I mentioned, working with the private sector to develop enabling environments to build—excuse me—build more renewable energy capacity in Vietnam, help to create more bankable projects. And these are one-on-one supports with those, as I mentioned, 11 projects. In addition to that, I lead the DPPA work with ERAV to develop a policy that would allow large energy industrial power consumers to access renewable energy from generators, from renewable energy generators.

And then, in component three we're really focused on energy efficiency and trying to create more comprehensive policy to support and enable industrial sectors or incentivize the industrial sector to conserve or use less power through more comprehensive policies that would allow more benefit, either to the user or to the generators.

So, DPPA. I'm not sure how many people have participated in these seminars in the past, but there's really—we're really talking about kind of two main elements. There's the objective, which is to enable large power consumers to access renewable energy. And the reason that many of these large consumers want to access renewable energy is to meet renewable energy goals, compliance goals. For example, many of the buyers that we're working with are RE100 signatories, and so they've set out metrics to look at consuming as much as possible, as much of their energy needs as possible from renewable energy sources. There's a lot of literature on RE100 or CDP. There's a UN program as well. And these are creating policy—well, not policy but framework and informal agreements that encourage the use of renewable energy in support of building out more renewable energy capacity in the various countries that they're operating—that these facilities are operating are. This is in support of policy—government policy, public sector policy, and in the hopes of meeting and mitigating greenhouse gas emissions.

As Evan mentioned and Chi mentioned, there's another compelling reason. That's certainly based on the cost, having a 20-year fixed term contract for power removes a lot of the volatility of power pricing. It ensures to a certain extent a reliable supply of power. And both of these are as important as

meeting your renewable energy compliance for many operating facilities. Having a clear understanding of what the operating expenses are into the future eliminates a certain amount of uncertainty for power supply and power pricing.

Our particular goals for this mechanism is to get to an immediate public consultation—May, roughly—where we're inviting the public to hear presentations by ERAV on the model that they've selected, and to outline next steps to achieve a pilot program at the end of this year, and to garner public feedback on the program and on the model that was selected. In addition to that, as I think Evan mentioned, Vietnam is moving towards a deregulated market. They're moving towards a wholesale market mechanism from a regulated market, and we're in the midst of that transition. And as we work with ERAV to develop the market rules for the DPPA, ERAV is looking for those market rules to hopefully implement, I guess as they move fully towards that wholesale market, and so to support some of that transition.

And as I mentioned before, the goal is to release a pilot program at the end of this year. And it will be a somewhat limited pilot program to allow kind of a proof of concept to allow the operational and financial aspects of the program to function in a limited way so that the government of Vietnam can understand where and how such a program will impact the power market here in Vietnam.

We've gone through several iterations of models under the DPPA program as we work with ERAV. We were initially looking at a sleeved model whereby a generator and a consumer get into a direct contract and then the power is sleeved through the utility. ERAV has decided that that mechanism was operationally difficult to insert into the wholesale market, that it would require too much additional operational aspects from the national dispatch center to manage the evacuation calculation of power as well as the consumption, and to manage that transaction flow, and to also account for what could potentially be additional power within the market. And so, ERAV and NLDC had pushed very hard and finally selected a contract for differences model, which is more of a financial mechanism between a buyer and a seller. And I'll go through the actual mechanisms in a second.

Once ERAV had decided, had selected that model, we did an additional review of the market to understand acceptability and ability for the different participants to enter into this agreement, a CFD agreement. And we've determined through that assessment that many of the developers, many of the investors, and many of the buyers have actually entered into CFDs in other markets and so are comfortable with it in principle, but of course have certain reservations around operating such a mechanism in a wholesale market in Vietnam since it is a fairly nascent market with not a lot of operational history and data to base a lot of the contracting on. And as I mentioned, we're looking to get to a pilot program at the end of this year.

So—whoops. Sorry. So, what are the arrangements? This looks complicated but it's actually fairly simple and straightforward. What we have are really three participants in the arrangement. There's the solar developer—we

also call it a “genco” or an investor, and we use those terms somewhat interchangeably—who has developed, invested, and built a solar PV array. We have a power consumer over here on the right, and they're a large industrial power consumer interconnected between 22 and 110 kV. And then, we have the market down here. So, this is the wholesale market right here. And I'll just kind of start at the beginning and walk through the whole flow of transactions.

So, starting here, the solar developer has entered into a DPPA with the consumer, a CFD arrangement. And I'll go through that in a second, but I'll just go through the flow first. So, they have a—kind of a CFD operating here. That enables the solar developer to raise capital to build the solar PV array—and in this case it could also be a wind farm as well. And that's based on the CFD itself and a strike price that was agreed on between the consumer and the solar developer. And that strike price is similar to a PPA price, a price per kilowatt hour. And it's agreed upon between the two and it's based on data that the consumer and the solar developer have agreed upon from the spot market pricing and from the cost of power, retail cost of power in that particular market.

The solar developer invests and then builds their solar PV array. They enter into a market participation agreement with the wholesale market down here to sell 100 per cent of their power that's generated into the wholesale market for spot market revenue. So, that is the first main transaction. That means the solar developer gets spot market revenue for all of their generation and all of that power is developed into the wholesale market.

The second transaction is the power corp has entered into a market participation agreement and they are accessing the spot market as well, the wholesale market, and receiving spot market pricing—it says “retail” here but that's just the vernacular that we've chosen—they're receiving 100 per cent of their market from the wholesale market and they're paying spot market pricing. Now, that is different—and we'll go into that in the next couple of slides—that's obviously different, it's cheaper than retail pricing. And that's part of the arrangement of entering into this CFD and participating in the pilot program.

And then, the third transaction is here between the solar developer and the consumer under that CFD, and that's based on payment in one direction or the other depending on where the spot market pricing goes. Now, there's two things to keep in mind. The spot market pricing for the power that's delivered into the market from the developer is not a fixed number. It's based on a supply and demand of any given day. It's based on seasonal differences in the hotter weather. The price of power can go up because there's higher demand due to more use of air conditioning, for example. In the wet season the price can go down because there's more hydro delivered into the spot market, the wholesale market, and so that's fairly cheap power. And considering 40 per cent of the wholesale—excuse me—the market in Vietnam is hydro, that can have an effect. And so, the market, the price that the solar developer receives

at that point would be lower. And so, that fluctuation is paid out towards the solar developer.

The CFD comes into play where the consumer pays a difference to the solar developer if the spot market price is lower than the strike price that they've agreed upon. And likewise, if the spot market price is higher than the strike price, the solar developer shares that upside with the consumer. That's the essential element, that's the essential mechanism of a contract for differences. It's a financial hedge on the volatility of the spot market price.

The other element that's important to consumers—as I mentioned, most all of these consumers are concerned about the consumption of renewable energy, are interested in consuming 100 per cent of renewable energy, and they need to verify that consumption as part of their reporting back to, say, RE100. And so, a renewable energy certificate or an environmental attribute needs to be generated on the consumption. The CFD will indicate a price, a strike price, as I mentioned, and a scheduled amount delivered. So, those elements plus a renewable energy certificate that is then submitted to RE100 meets the RE100 compliance requirements and allows the consumer to then take credit for consuming whatever that percentage is of power that is renewable energy. And that's very important. That's as important to many of these consumers as price visibility and supply certainty.

Let's see if I can... all right.

So, that complicated slide leads to this slide here, which shows the two contractual arrangements. Over here on the left is the arrangement between the consumer and the GENCO, and that's that CFD. And all that is simply doing is hedging the price that the spot market—that the generator, the GENCO is receiving from the spot market. And as I mentioned before, it's plus or minus depending on where the spot market goes. And I'll—there's another slide that comes up that I'll kind of show that, a little bit more of a visual representation of that. It says here "hourly spot pricing," but in reality the way that the Vietnam market operates these are going to really be half hour increments. And that's just a function of how NLDC settles the spot market price.

In addition to that agreement—that's the CFD agreement—there's the consumer agreement with the PC. Now, I mentioned before that the power consumer is accessing wholesale market pricing, which is cheaper than retail market pricing. That would be a separate agreement that the consumer and the PC have to enter into as part of the DPPA mechanism. So, up here there will be two flows of cash that come out from the power consumer. One is the payment to the GENCO under the CFD and one is payment to the PC for the electricity they receive through the—through that consumer agreement.

So, here's a little bit of a visual representation of the pricing. The fixed price is that spot market price that I mentioned before here, and that's agreed upon between the GENCO and the power consumer. And in this example—and this is just indicative—that price is negotiated between the buyer and the seller commercially and is not dictated by any terms that the government has. So,

this could be seven cents, it could be nine cents, it could be whatever the two parties agree to. In this scenario we've chosen eight cents a kilowatt hour as the strike price.

The blue, the dark blue bars down at the bottom represent the spot market price, and as you can see it fluctuates even during the day depending on supply and demand. And there's usually two peaks during the day in a typical consumption curve. The difference—the light blue is the difference. That's the CFD payment between the power consumer and the GENCO, and that makes up the difference to get to the strike price. So, in picking just one example, at 6:30 in the morning the GENCO receives dark blue payment as their delivered power into the wholesale market, and that's—let's pick something easy—let's just call that four cents in round numbers, where they're receiving that for that particular hour—that half hour, excuse me—to the— from the wholesale market. The consumer then makes up the difference, which in this case would be four cents as well, to get to the strike price here. And that's how the GENCO is made whole and that's how the—our consumer then buys 100 per cent of their daytime load at least under this CFD mechanism.

This slide represents the difference between the assumed, say, strike price and the retail price. This dark solid line represents the retail price. There is off-peak, peak, and normal—I think—or, is it off-peak, normal, and peak pricing? And this is how the curves go within those three pricing brackets. And as you can see, it spikes during the mid-day, which is also coincidentally when you've got some prime RE—renewable energy—generation. And then the bars here represent the total price—well, excuse me, the spot market price.

As you can see in the bottom, there's also this red bar. And that represents a DPPA charge. There's a third fee in there, and this fee represents the fixed cost for transmission and distribution and overhead, so it's for EVN to recover their costs. Under retail pricing this fee is baked into the retail price. Since the power consumer is not receiving retail power and not paying retail power pricing, the fee then has to be added into any of the wholesale market pricing that they're paying.

And then, here's a comparison, a visual comparison between the two. So, as I mentioned before, this would have been the strike price here. There would be a red bar; that would be the eight cents. This is all of the scheduled PV-delivered power in and it's made up by three fees, which is the DPPA charge at the bottom, this is the wholesale market—spot market price for each delivered—in this sense—half hour increments, and then the blue is the DPPA difference, the charge that they pay, that the buyer pays to the GENCO. What you notice here is during the early morning the buyer is paying more for power, and then during the peaks they're paying less for power. And then, of course, off-peak here the buyer, the power consumer, because they're accessing spot market pricing, is also paying less for power. And again, over here they're paying less for power too.

So, if you average out the total cost for power under the DPPA mechanism and compare it to the cost for retail power on any given day, it's very close to being the same price. There's a few pennies difference per kilowatt hour, and what that is considered—or could be considered as part of the additional price that you're securing renewable energy to meet your compliance criteria.

This is a different representation that kind of gives you an idea of how the two supplies mix on the consumption side. So, this dark blue line here represents a consumption by the power consumer and of course the red curve is the generation by the GENCO. This pink section in the middle represents the power consumer's RE100—or, excuse me, the renewable energy consumption, the delivered power into the wholesale market and then the consumption out of the wholesale market. The rest of the light blue under a DPPA then represents the power consumer's consumption under the wholesale market agreement. And then, the dark red or the dark pink represents delivered power by the GENCO into the wholesale market where they're only receiving spot market pricing and not receiving the additional fee paid by the power consumer.

So, here's a good kind of walk through and some scenarios or some examples of what the pricing actually looks like. This blue column here is business as usual—so, eight cents a kilowatt-hour is the current retail power price for power consumers. The next column over is the DPPA price support—so, this is the additional amount to the spot market price that the power consumer pays to the GENCO. This fee only goes to the renewable energy GENCO under that CFD agreement. This is the spot market price, and you can see how it fluctuates: a low spot market example and a high spot market example. And then, this is the total outlay and inclusive of the DPPA charge by the power consumer for energy, and that's split up between this fee here to the spot market and then the price support back to the GENCO. So, as you can see, 3.0 plus 6.3 gets you to 9.0, 7.2 plus 2.1 gets you to 9.0—9.3 cents. And no matter what, this is the strike price that was agreed upon plus the DPPA charge between the buyer and the seller no matter where the wholesale market's price goes.

And as you can see, when the price, the wholesale—excuse me, the spot market price goes down, what you're making up the difference is here between the GENCO and the buyer so that neither of them are out anything beyond what the strike price is. The difference is, however, outside of the scheduled delivery is the retailer—excuse me, the power consumer is buying, then, low spot market price for anything that's not part of that delivered power.

This column over here kind of averages out, as I mentioned before, if you took a full 24-hour period and you looked at total retail outlay for indicative power consumption and wholesale market and RE100—excuse me, RE, renewable energy consumption, this is your averaged kind of cost for consumption. And as you can see here, the difference, this column here is the premium that would be paid. So, if you look at the difference between the average cost that the buyer is paying for power against the business as usual

case, the difference is only 0.3 cents. And as you can see, between low spot market pricing and high spot market pricing, low production and high production, the spread is very minimal in the differences on average between business as usual, retail pricing, and total RE consumption and wholesale market price. So, this should make it very attractive, at least from a financial perspective, for buyers, allowing them to get into these DPPA mechanisms.

This gives a little bit of a—more of a—some information about the price breakdown. I think I'll skip it. It basically reiterates where the different pricing is coming from. We talked a little bit about it earlier. The blue here is simply spot market pricing that the renewable energy consumer is paying. The pink is the spot market plus that DPPA charge. And again, this is delivered power, so the power consumer is not receiving any of that power there, but the GENCO is selling it to the spot market.

And that was the short, fast version. I'm sure it made perfect sense to everybody and there is absolutely no questions whatsoever.

Rob Thank you very much, Gary. That was a lot of information, but you handled it—

Gary [Laughs]

Rob – handled it very well—

Gary Yeah, it was.

Rob And gave us a couple of good different ways to look at it, so that's much appreciated. Let me take this back over here. We've got a couple of questions here. We are over time so let's try to—I'm going to have to just keep it down to just a few here and then we'll close.

The first question that we received is asking whether or not the DPPA applies only to solar or does—could it be applied to wind projects for this pilot?

Gary The pilot is open to both wind and solar. So, it's—renewable energy is the key factor. We'll set aside biomass for now, but these are wind and solar projects that are—that the program is open to.

Rob Okay, great. And the next question we got is: "Is it contemplated that the DPPA charge will apply to all energy purchased over the 24-hour period and not just the energy supplied under the DPPA?"

Gary Excellent question. So, there's the DPPA charge, which covers the administrative, line loss, and overhead that the system market operators incur. And so, that covers all of the consumption for a 24-hour period. So, any wholesale market-priced power that's bought by the power consumer incurs the DPPA charge. There's the fee—and I understand that the language gets a little confusing because it sounds repetitive—but the additional fee for renewable energy that's paid by the power consumer to the GENCO, the

power regenerator, that is just paid for deliberate energy into—that the power consumer receives.

Rob

Great. Great. Thank you for that. And sorry we could not get to the other questions. Just some of them, I think, were a bit long. We will try to send e-mails out to folks to answer those directly. But I would like to take this opportunity to thank your presenters and also to all of you who have called into the webinar to hear what's going on recently in Vietnam and also to find out what's potentially happening under the DPPA pilot program. Thank you all very much for your time here.

We've got a couple of web links that are up on the screen here that you can see. The Clean Energy Solutions web page is where you can go to find the YouTube presentation of this in addition to other webinars and other interviews that have been put up on the—that resource's page. In addition, you can go to the Clean Energy Investment Accelerator home page for detailed information about that program that Evan provided some details on. And specifically for the Clean Energy Solutions, you can go to the Ask an Expert program on that Clean Energy Solutions web page, backslash "expert" to get more information about that program as well.

That concludes our presentation. Again, thank you all very much for joining. There—when we close the presentation, there will be a short survey that pops up. I'd appreciate it if you could provide some responses to that so we can kind of track how we did. And that's it from here. Please enjoy the rest of your day or your evening and hope to see you guys again in the future.