Nate Allen: All right, good afternoon, everybody, and thank you for joining us. I'm gonna kick things off; my name is Nate Allen, and I am the Higher Education Sector Lead of Better Buildings within DOE here. I know this is a busy time of the year in general, but that's especially true in higher education, so I'm really pleased you're all sharing your time with us. I can tell you, having reviewed our contents for today carefully, that I think we're gonna have a great next hour together. I wanna quickly stress why I'm so excited about this. Some of you on the phone know my background.

I've been involved in building efficiency work with educational institutions for the better part of a decade now, and it'll probably come as no surprise to anyone that since day one of my career, I've been hearing people talk about access to capital as a barrier to progress. I feel very happy about what Better Buildings is able to offer right now through the new financing Navigator and our high red primer, because I think we've created resources that are targeted enough to meaningfully help explain how to approach accessing money to a variety of different _____ levers.

And we'll hear about some of these approaches today through our star Better Buildings partners that have joined us to present. I wanna thank these partners for taking time to share their insights on this call, and that's both today as well as through the input they provided during the creation of these resources. The final thing I'll say is if you're new to Better Buildings, please stay on the line and chat with us after. I can show you this is a topic that we will continue to address, including at the 2019 Better Buildings Summit, and we hope to see all of you this coming July 9, 10 and 11, here just outside D.C. actually. More on that later in the hour.

I think that's enough of a welcome from me. Let's get into some of these resources I just mentioned, and to do that, I'm gonna turn things over to my colleague, Joe Invik, who runs our Financial Allies Team and is the mastermind behind a lot of this work; so Joe, take it away.

Joe Invik: Thanks, Nate; really appreciate it. Can you go to the next slide, Holt? It's great to be here with y'all today. Again, my name is Joe Invik, and alongside Holt Mountcastle, who's here with us today, I run the Financial Allies component of the Better Buildings Challenge. And energy project financing in higher education is a topic that's near and dear to my heart, so I'm really excited to dive into this with y'all today. A couple quick logistical notes before we get started. So we are gonna have time for Q&A at the end of the hour, but you don't have to wait to ask your questions; you should see a little chat box in your webinar screen.

You can enter questions into that chat box at any time, and I'll sort of curate them at the end, and if you have particular questions for individual panelists, please be sure to note that person in your question and I will direct it to them. The other thing to note is we're gonna be recording this webinar for posterity, so if you're like me and you like to type furiously about topics you're interested in, you don't have to type quite as furiously 'cause we'll have a recording that we'll send out to you in the near future. So with that, let's dive right in.

So the three big goals I have for us over the next hour are, first and foremost, to introduce some tools that the Department of Energy has recently released Nate alluded to, to help you get energy projects funded in your facility. Second is where we'll spend the bulk of our time, looking at three successful case studies from some market-leading institutions that we have with us on the call here today. And third, the ultimate goal here is for you to take back practical insights and resources that you can start using tomorrow to get access to capital for energy and sustainability projects in your facilities.

If you go to the next slide…again, my name's Joe Indvik with RE Tech Advisors, and we've got a real all-star panel with us here today. So first we're gonna have Jesse Warren from UVA, talking about how they have navigated their internal budgeting process to finance energy efficiency projects. He's going to be talking about something called Delta Force, so if you're not intrigued already, you are now. Then we've got Dr. Wolfgang Bauer of Michigan State University, who will speak on their experience with power purchase agreements as financing mechanisms renewable energy projects, particularly solar.

And then we'll hear from Tim Jones from Chesapeake College, who's gonna describe how they've led local partnerships and utility incentives to get energy projects done. We're really excited to hear about these three very different but all very successful approaches to getting capital for energy projects. We can move to the next slide. I'm just gonna just briefly cue this up but turn it over to the panelists here very quickly. The inspiration for this webinar is a financing primer for energy projects finance in higher education that we recently released.

And this came out of a number of requests we've received to provide some specific insight and guidance about how individual barriers and opportunities to add to your project finance for specific sectors. Now, I think higher education was an obvious place for us to start, so I've been working, like Nate, in higher

education energy and sustainability for my entire career. The very first thing I did out of college was help establish a green revolving fund at Dartmouth College, at my alma mater, and I'll be the first to tell you – as I think many other people on the line would say as well – that there are some truly unique barriers to getting energy project finance done in higher education.

And colleges and universities can be very big ships that are very hard to turn, and it can be difficult to get administrative acceptance of new ideas or financing mechanisms that are often perceived as risky, regardless of how risky they may or may not actually be. But at the same time, we also have some incredible examples of higher education serving as a sort of living laboratory for energy innovation, not just on the technology side, but also on the business file renovation side, particularly financing, and I think the three folks we have with us today are three prime examples of this model innovation in this phase.

So because there is such an opportunity to improve energy performance and to drive business model innovation in higher education, we developed over the last couple of months the Financing Primer, which is designed as a one-stop shop of information, resources and best practices to help higher education institutions find and structure their investments in energy projects within their own facilities. Whether that means using outside capital or looking at structuring their own internal investments are two of like green revolving buttons.

So some of the areas that we cover in the Primer include common barriers and common financing solutions for the sector. We have a long Financing Consideration section that talks about some of those things you may wanna be considering as you start to evaluate third party and internal financing options. We have a State of the Market section that pulls together all of the latest market data on who's doing what in the sector, including some macroeconomic data on the total volume of projects finance being done in higher education. That's a useful way to kinda see how you stack up against your peers and the market as a whole.

We've compiled some Better Buildings case studies, including both showcase projects and implementation models that give you a deep dive view into some successful individual approaches to getting energy projects financed. And then we have a little miniature Implementation Guide, a set of four or five next steps at the end, so things you may wanna look at or consider as you start to finance projects in your facilities. This Primer is available now at the link

you see below. You can also just Google Better Buildings Higher Education Financing Primer, and that'll get you there as well.

And if you go to the next slide, Holt, the Financing Primer is part of a broader Better Buildings resource called The Better Buildings Financing Navigator. So the Navigator is an online tool that helps individual organizations, including colleges and universities, find financing solutions for energy and renewable energy projects. The idea here was to take all the information that's out there in the form of white papers that many of us don't have time to read and distill it down into a simple 15-minute online experience that gives you everything you need to know about financing for energy projects.

There's three things you can do in the Navigator. First and foremost, you can explore the financing market, compare different financing mechanisms to each other by kinda comparing them back to back. You can in the Find Financing section enter some basic information about your project and your preferences, and we will actually match you to financing mechanisms that might be a good fit. And third, and I think most powerfully, you can also connect directly with the Better Buildings Financial Allies through the tool.

So either financing companies that are ready and able to finance immediate projects in your facilities or to answer questions you have about financing. So you can get to the Navigator by just Googling Better Buildings Financing Navigator or following the link you see at the bottom there. And if you go to the final slide here, I do wanna highlight this. So the financing companies that we can connect you to through the Navigator, these are the Better Buildings Financial Allies, so this is the group of 46 leading energy efficiency and renewable energy lenders who like many of you on the call have signed on as partners to Better Buildings.

But instead of committing to improving energy performance in their own facilities, they have committed to deploying capital to help you and others improve energy performance. So they include some of the big guys like Bank of America and City. We have some specialized financiers working in everything from case financing to efficiency as a service to loans and leases to TTAs. And then we have some smaller scale regional, state and local providers as well, so chances are no matter what type of financing you're interested in or what your particular barriers might be, there's probably a financial Ally who can help you solve those problems.

I should mention that the Allies have cumulatively funded $12.1 billion between 2012 and 2017, so they represent a very significant chunk of the overall market. If you would like to speak to an Ally or learn more about the network, you can go to the link here, or just go to the Navigator and click on the Connect with Allies button, and this tool lets you kind of slice and dice the list of Allies, depending on whatever it is you care about. So you can sort them by the types of buildings that they operate in, the types of financing products that they provide, and even the regions that they operate in.

And as Nate mentioned, another great way to connect with the Allies and to learn more about energy finance in general is come to the Summit on July 10 and 11 in D.C. This is – we always have a lot of great financing content at the Summit, and many of the Financial Allies will be in attendance as well, so it'll be a great place to make some connections and maybe move forward with financing for your projects. And finally, if you have any questions beyond that, then feel free to shoot an email to Holt or myself, and you'll see our contact information at the end. So with that, I am going to turn it over to Jesse; Jesse, please take it away.

Jesse Warren: Thank you. So my name's Jesse Warren, and I'm an energy engineer at the University of Virginia. Here at UVA, we manage about 16 million gross square feet of buildings, and that includes a full-service health system and hospital. That is all part of the university's Comprehensive Sustainability Goals, and we in the Office for Sustainability work to make those reality. One of the interesting things about an Office for Sustainability is actually houses within Facilities Management, and previously it was housed within Energy and Utilities.

That is the Energy and Utilities enterprise that's responsible for selling electricity, chilled water and hot water to our buildings on grounds, and that positioning gives us a unique opportunity to affect the utility bills of the facilities. Next slide, please. So what I'd like to talk about today is our Delta Force program. Delta Force began in about 2008, when Energy and Utilities was looking to improve the efficiency – or what we call Delta-T – of one of our chilled water systems with respect to our buildings. We invested about $400,000.00 to go into those buildings, retro-commission the air handlers, and replace key chilled water valves, and we were able to get six months' payback on that $400,000.00.

As a result, the university took their $400,000.00 back, and they gifted us the other $400,000.00, and we used that as seed money for the Delta Force program. Next slide, please. So the way Delta

Force works, we're like an internal energy service contractor for the university. We identify opportunities to save energy and we invest in those opportunities, and we recover that funding through energy savings. Because we're the utility provider, we can hold the customer's utility consumption baseline steady while we do our efficiency projects. We'll recover 125 percent of our expense from their utility costs, so the project has no risk to them.

There's no risk of their consumption going up because of our work, unless there's changes in occupancy or weather. We've also been granted a million-dollar line of credit, if needed, so that our operating expenses don't just come out of the initial 400. We can actually go negative if we need to, in order to invest in greater utility savings down the road. Next slide, please. So I'd like to talk a little bit about Clark Hall, which is one of our sort of most recent projects. This project is in a historical building on grounds; this was the original Law School built in the 1930s, and then in the early 2000s, we added a wet lab onto the back of it.

So now it's 180,000 square feet of classrooms, library, and environmental science laboratories. Next slide, please. And the university identified about $750,000.00 for a building digital control system upgrade. At that time, we latched onto that project and said, "Well, we don't wanna just upgrade the pneumatic controls in part of the building; we wanna make sure that we do the entire building." So we took the university's $750,000.00, and we put another $1.25 million into the project.

That paid for an energy engineer who would be the project manager, as well as all of the additional improvements that we're gonna make to the project, including using LEED EB O+M as a framework for our sustainability decisions. Because we recover 125 percent of our expense, the first $1.56 million goes back to us; the remaining savings then go back to the university. This is an opportunity to partner with our Deferred Maintenance Group, because in their view, we were all working to improve the facility condition of the building as well as improve the energy and sustainability performance. So next slide, please.

You can see how our impact has grown over time. This slide shows the last roughly ten years of Delta Force expenses and results. I mentioned that the program started in fiscal year '08, but they were very small expenses in the first two years, so I rolled all that into the fiscal year '10 piece. But you can see that we've avoided over $35 million in avoided energy cost, and we've only spent about $15-1/2 million to do it, so this has been a great

opportunity for us to get significant financial returns as well as significant carbon benefits with a small up-front investment.

Granted, there's a commitment to making sure that up-front investment continues to grow. Next slide, please. For Clark Hall, we did a lot of things; but in short, we upgraded the building to energy efficient LEDs; we worked to fix and repair a number of the systems, while making significant improvements to things like building controls. But we used LEED EB O+M as a framework, so we got beyond just looking at energy cost, and we wanted to look at water expense, waste opportunities, even where we could improve the storm water management of the building.

So we did things like installing low-flow toilets, urinal and sink aerators throughout, which reduced our restroom water use by about half, which is, again, beyond the scope of our original retro-commissioning initiative. Next slide, please. So to explain some of the things that we do do, we assess and repair HVAC systems, so we're going in and we're looking for opportunities not just to make these systems work as well as they did when they were designed, but make them work even better than they did before.

In this case, you can see where we've gone back and added things like insulating jackets in order to both reduce energy loss, but also mitigate a burn hazard to facilities management and other personnel. Next slide, please. And I mentioned that the bulk of the investment came from the pneumatic to digital HVAC conversion. All of these systems are running on air pressure, so this gave us an opportunity to remove the building compressor, which significantly saves energy, but also to implement all new control sequences, putting in things like down duct static pressure reset and all kinds of technical features that allow the building to save energy without the users noticing.

So how did we do this? Next slide, please. We do this through our Building Optimization Team. The Building Optimization Team is a cross-functional team of mechanics, pipefitters, HVAC technicians, controls technicians and electricians. Their job is to go through these existing buildings and be able to hotwire air handlers in such a way that they run and satisfy the occupants so that we can keep buildings occupied while we make these kinds of improvements. Now, it's not to say there aren't occasional shutdowns, but this building was completely occupied during the duration of the project that I'm describing.

And the Building Optimization Team is one that we have to thank for minimal disruptions as well as a very high standard of quality,

because our internal teams are the ones who are gonna be called back to maintain and work on these systems, so it's in their best interests to make sure it's operating at its peak. Next slide, please. Now, there were two things that we did that we thought were beyond our initial retro-commissioning activities, and the first is air change reductions.

We looked at where we were over-ventilating laboratories based on old codes and old uses, and we successfully turned down the air changers in those labs significantly in order to save energy. This is going to be a growing activity on our campus; we're looking at the Department of Energy Smart Labs Accelerator and looking at ways to take the reductions that we see here in Clark Hall and apply those same strategies to other buildings on grounds to save significant portions of our energy use in laboratories. Next slide, please.

The other thing that I would say is truly innovative is working with our Outreach Team. The Office for Sustainability is divided into two sides. One side works on Buildings and Operations; the other side works on Outreach and Communication. The Clark Hall project was our attempt to bring both halves of that together in order to really celebrate the energy savings and encourage the people in the building to change their behavior according to what we're trying to propose.

So here in this photo, you can see Dana, our Outreach Coordinator, working with folks to take transportation surveys to understand the way students are commuting to and from grounds, and that also works toward our LEED certification. We also made a pledge board, where we identified key personnel in the buildings, key professors, key folks in the libraries, et cetera, and they made a commitment to reduce their energy use in the space. And then we got others in the building to come over and sign that board to keep that commitment alive. Next slide, please.

So in terms of activating our occupants, we did that in really three ways. The first is working through the transportation surveys and the things that we needed to do for LEED EB certification. The second was bringing our Green Workplace program there. We have a Green Workplace program at UVA that functions very much like LEED certification, where the workplaces can agree to do certain things in order to achieve points, and the Environmental Sciences Office earned silver certification for their sustainable practices. We also piloted our new Green Labs program here.

Green Labs is how we work with our principle investigators to understand the research that they're doing in their spaces, and how we can make that more sustainable. So four labs participated in in-depth interviews about their practices, as well as some labs participating in our UVA Freezer Challenge. Next slide, please. So the big payoff of this is two-fold. The first was LEED version 4 EB O+M silver certification. This was the first project that the University of Virginia had undertaken under the Existing Buildings Operation and Maintenance LEED Certification Pass.

We certified the building as silver, and it's the first V.4 EB O+M project in the State of Virginia, a fact of which we are very proud. LEED looked at a lot of different areas, like green cleaning, procurement, the food that we serve, the integrated task management policy, as well as the way we deal with landscape and waste. In reality, we weren't changing our policies so much as we were documenting them in a way that worked for LEED. Next slide, please. Here's the results. You can see that we spent $1.2 million in utility costs in fiscal year '14. By fiscal year '18, that was down to $435,000.00.

That means we saved over $750,000.00 a year in avoided utility costs. Since our entire project cost us about $2 million, that means we've got about a 2.6-year payback on a project that has improved air quality, occupant comfort, and broadly, sustainability in the building. I look forward to taking any questions that y'all have when we're done, but back to you, Joe.

Joe Indvik: Awesome. Thanks, Jesse. I have to ask for myself and for others on the line what the inspiration for the name Delta Force was? Is that a nerdy engineering joke?

Jesse Warren: Well, we disagree on what it is. The folks who were on that very first project claim that the name Delta Force came from our pursuit of Delta-T, so looking at the chilled water supply and return temperatures coming back from our building and trying to make that spread higher. Today, we think of it as the delta between your current utility bill and your past utility bill, so the Delta Force cost recovery mechanism captures the delta between your current spend and your old spend.

Joe Indvik: Oh, okay. I like it. It also has the added benefit of invoking Special Forces, which is never a bad thing.

Jesse Warren: I'll have to agree; thank you.

Joe Indvik: Well, that was fantastic. I think now we wanna hand it over to Wolfgang, so we just talked about an internal financing an project management structure for energy efficiency. Now we're gonna turn to solar energy financing through power purchased agreements. Wolfgang, please take it away.

Wolfgang Bauer: Thank you. Please go to the next slide. So I'm showing you an aerial shot of Michigan State University's campus. That boundary's not a physical thing; it's just something that I drew on top of the map, so you can see where we're located. In the middle of this picture you see two golf courses, and just to the north of it, you see our power plant; it's sort of a big old coal pile. That picture was taken four years ago, and that coal pile doesn't exist anymore. We switched completely from coal to natural gas, and this was part of our energy transition plan. So if you could go to the next slide.

In 2010, a few of us got together and said, "What do we do about global warming, about renewable energies, about the future of the planet?" As a top university we have to take leadership, and we developed this energy transition plan. It was approved by our trustees in April 2012, and it has some concrete targets. 2015 obviously has passed by now, and then every five years after, for renewable energy fraction and for greenhouse gas emissions targets. And eventually we want to get to 100 percent renewable, which is sort of an aspirational goal. Next slide.

So I'm a physics professor as my day job, and I have to show you at least one equation, so this is my equation, and it just says energy is money. And that's my main take-home message: whatever you want to do in terms of renewable energy integration into your portfolio, if it doesn't save you money at the same time, it really shouldn't be done. Next slide. So the Michigan State colors are green and white, and whenever I go somewhere and I have one of the MSU Athletic Department-inspired clothing items on, somebody will yell, "Go green," at me, and I'm expected to yell back, "Go white."

But green is, yes, it's the color of environmental sustainability, but it's also the color of money, and so I can't say this often enough and intensely enough. Financial sustainability is an absolute cornerstone for environmental sustainability. If you want to make lasting change, you can't just throw money at a problem and make it green, but it has to also save you money in the long-term, because eventually the initial money runs out. And as we've just seen at the University of Virginia example, you can actually multiply that initial money and invest it in further green projects, and they all have to save you money.

It was demonstrated beautifully there, and I will demonstrate for you also that it works in our case. Next please. So I'll walk you through our decision tree of our renewable procurement decision. Next. You can either have a virtual asset or a physical asset; with virtual, I mean you can buy RECs. And next click, please. For me, RECs are the equivalent of indulgences in the Catholic Church 500 years ago; you buy forgiveness for your sins. But somewhere, somebody is making these green assets, and by you buying them, effectively they're producing our fossil fueled assets, so I wanted to have a physical asset on our campus. Next.

Well, you can go small and you can go large, and I would just say we're America, so we have to go large. Next please. And then next. A question is do you want this on-site and off-site? I've shown you a picture of our campus. It's fairly easy for us to go on-site, but off-site was also prohibited because of Michigan being a regulated state. Next please. And the state is nicely divvied up by the large utilities that control the flow of electricity, so their wires, and there's only less than 10 percent retail open access allowed, by law. Next.

So then the question is, if you're on-site, do you invest your own money, or do you get somebody else to invest their money? And the project that I'm talking about here was on the order of $20-$25 million, and if I take this to the Board of Trustees, then there's always another building that costs about the same. And then the question is, "Well, should we have the building, which is part of our core mission, or some energy installation that may or may not pay off?" And so we were basically forced into a power purchase agreement, where somebody else would put the money down. Next please.

This is also helped by the investment tax credit that was introduced by the Obama Administration; that is not available to us because as a public institution of higher education we don't pay taxes. Next please. So once you've decided on a large on-site PPA, you can pick between wind, solar, hydro, or bio. Next please. Bio we have done, and that's another project that I could talk about, but I only have 12 minutes, so I'm gonna concentrate on solar. Next please. And then solar, the question was, should we do ground mount, rooftop, or what we decided is carport. Next please.

And we went with carport – next please – because the installation in the end was 45 acres, and our College of Agriculture really didn't wanna give up 45 acres of valuable farmland. So – next please – if you watch these Big Ten football games, you may say, "Well, why do you do solar in Big Ten country, where there's

always snow during the football games, and how can solar work?" What I'm showing here is a world map of solar radiation, of usable solar radiation that's composed of direct and ambient, and the scale is in the lower left corner.

And you can see Big Ten country is sort of greenish color, and the best you can do in the U.S. is maybe orange or yellow, and there's really only a 10 percent difference, surprisingly, between the two. So that means solar is really possible everywhere in this country. Next. And further, it's getting cheaper and cheaper; so this is a compilation by NREL, and they are listing for photovoltaic systems costing charts as a function of year when the project is started, and it's split up in just the module costs in yellow, and then the inverter and hardware and labor cost, and so on.

And you can see – we're not talking residential, we're talking somewhere between commercial and utilities scale – that costs are falling and are safely below $2.00 per watt now. And so if you have a 10-megawatt installation that you're starting right now, it will cost you somewhere around $15 million, maybe, or even as low as $10 million, depending on the scale. Ours was more expensive because we started on this path in 2014. Next please. So this is our timeline, going from bottom to the top, the kickoff of the energy transition plan and the adoption by our Board I've already covered; that was in 2012.

In 2013, we built this anerobic digestor, which basically takes care of our animal excrement waste and cafeteria food waste and turns it into a biogas and then useful electricity and heat, plus organic fertilizer. So the solar we started by getting ourselves a partner that conducted the business of bidding for us, and that was CustomerFirst Renewable; we awarded the contract to them in September 2014. And then the winning bidder was Innovators Solar; they got the contract on July 8, 2015, and Alterra joined them in 2016. The construction started in March 2017.

It was completed right around Christmastime of 2017, so we have now one full year of this array operation under our belt. Next please. In the aerial shot of the central part of campus that you see here, I'm drawing in – Google Maps hasn't updated, so I can't show you a current picture, but I can show you where the arrays landed. They were basically built over our largest commuter parking lot. Next please. So there are five parking lots, and I've drawn these blue areas over the parking lots that I've covered now with solar arrays, and the wattage that they deliver at peak is also indicated. Next please.

So there were covered 5,000 parking spots and 45 acres in these 5 parking lots; we used 300-watt panels, 40,000 of them, and that translates into 13.4 megawatt D.C. peak power, and after it goes to the inverter, it turns into 10-1/2 megawatt A.C. peak power, delivering 15 gigawatt hours of solar energy per year, which is roughly enough electricity to completely power 1,800 U.S. households for an entire year. Next please. So our carports are 14 feet off the ground, so that even the largest R.V.s can park there during football games. They're anchored by these 9-foot-wide concrete blocks. Next please.

But that's not enough, because these are giant sails, so we have to drill 30 feet into the ground and anchor them with steel bars. Next please. So this delivers 18 percent of MSU's peak power demand, and 5 percent of MSU's total annual energy consumption. Next. It is the largest solar carport array in the U.S., and that's all I really have to say about this picture. Next please. At night, we have LED lighting under there, which gives a much better quality than the old parking lot lights, and a much, much lower energy consumption. Next.

So with these slides, I'll demonstrate peak shading. So this is the current year, hour by hour what MSU's main campus consumes in terms of electricity, and you can see it goes as low as about 27-28 megawatt, and then as high as 62 or 63-megawatt. Next please. This is the overlay of the solar production, again hour by hour, and you can see there's a seasonal variation; during the winter months it's not so great, but when our largest air conditioning load kicks in during the summer months, the solar array's also there to conduct a peak saving. Next please.

Which you can clearly see in the form of the yellow curve that's overlaid now, the blue curve that sticks out above the yellow curve, that's the peaks that we have lopped off with the solar array. Next please. This is perhaps the most important slide that I have, because as I said, it needs to have financial benefits to make a green energy installation, and this power purchase agreement allows us to do just that. The 2015 rate was for buying power off the grid during the time that the sun shines for us was $91.00 per megawatt hour.

We bought the power slightly more expensive through the carport PPA simply because it is a carport. We could've done this much cheaper ground mount, but we didn't want to spend the land. But we have a 25-year power purchase agreement at fixed cost, and according to the DOE Energy Information Agency's projections, the electricity prices will rise by 2.3 percent per year, so if you

follow this curve out, then our calculations are that we will save roughly $10 million in electricity procurement costs over the 25-year period of this power purchase agreement.

So we didn't have to put any money down, but the savings kick in almost immediately, and this project shows that on this scale, green power really is cheaper than brown power. And I will say that this is only possible really because MSU has a microgrid that provides our overall power that can firm these fluctuations, which would otherwise be very costly. Next please. So this is an aerial shot of the largest of the five carports, and I'll leave you with that. My contact information is there. You can contact me offline as well. Thank you.

Joe Indvik: Great, thank you, Professor. That slide on your decision tree might be one of the best slides I've ever seen; that was very entertaining and very informative, so thank you. So we are – one more presentation left here, so I see a couple of questions starting to trickle in, but please get your questions in during this next ten minutes, and we'll be sure to ask them during the final ten minutes of Q&A. And with that, we're gonna turn it over to Tim Jones to talk about the power of partnerships in getting solar and storage projects done. So Tim, please take it away.

Tim Jones: Right, thanks. Go ahead and put it to the next slide. As we said, I'm Tim Jones. I've Vice President for Administrative Services, so I wear several hats here. I'm the Chief Financial Officer. I'm also responsible for all of the facilities, so I kinda play a dual role with respect to energy; so I have a lot of interest in seeing this go forward. Can we go to the next slide? Just very quickly about Chesapeake College. You've heard a lot large-scale. We're very small-scale. Chesapeake College is actually the second smallest community college in Maryland.

We serve a very large area, 20 percent of the state, and have 20 percent of the population, so also very rural. 2,000 students a semester; more than half of them are part-time, and then we have a large non-credit offering, which is very, very part-time. What's interesting is if you look at us as far as scale, just over 200 in total employees, including all of our faculty, plus we have a total budget, operating and capital, of less than $30 million a year, so very, very small scale. One thing that we have going for us when it comes to sustainability is we're in a very _____ to be a very rural area, very ecologically sensitive.

As you can see, most of our service area sits on the Chesapeake Bay. Next slide. And that's really important for us, and here's why.

I'm gonna talk about a couple of different projects that we've done, but first is a solar array, much like what Wolfgang was talking about. We have a megawatt and a half ground mount system, plus 250 KW in canopy, and we chose canopy to make a statement to our local community. We're a community college; we're really charge with taking the resources that are out there and showing them how it can be applied to the region, and that's really what we wanted to do.

Using the same decision tree that Wolfgang talked about, we came to the same decision about using a PPA. We did not have the funding to go out and build this ourselves, so we were able to offload all of those costs – that's made it about $3 million – onto that provider. We went out with an RFP. We had 13 bidders, and we selected as a low cost bidder SolarCity, who is now Tesla Energy, and we have a 20-year PPA with them; and there's no cost up front for us to do this, and there's no operating cost, and they're estimating that operating cost is about $60,000.00 a year. Next slide please.

So some of the things that are really important here: let others own the asset. There's no reason – that's one of the easiest ways to keep capital our of your institution. We were very careful in how we set the RFP specifications. We gave them the relative size, we gave them the attributes that they had to meet, and we gave them special requirements. In our case, we wanted E.V. charging stations thrown in there for free. We also specified that they had to provide all the development, the operation, the maintenance, and then any restoration costs at the end of the PPA.

That gives us now an incentive 20 years out for them to want to renegotiate or redevelop, because there's a cost event for the end if we don't continue the relationship. We also were very clear and up front about the performance expectations. Wolfgang said, it has to make economic sense for it to be integrated into our system. We were very clear with that. We were very clear. Folks around here knew what the cost was for grid energy. But we also gave them the opportunity to provide ideas for innovation; what haven't we thought of? Next slide, please.

As you can see, this is a couple examples. You can see the parking canopies that we had. There's a couple of the E.V. chargers; we actually have a total of 14 E.V. chargers on campus now, 10 of them because of this project. One of the things that we ran into while we were going through this process, on getting the interconnection agreement we ran into a little snag. So working with the utility, which is here Delmara Power, which is part of

Pepco and Exelon, they came back and asked us if we could do a slight modification to our array.

And they actually wanted to test a weather station component on the solar array, which would allow them to do predictive modeling of real-time weather conditions and allow them to very the output on our array by no more than 3 percent in 1 percent increments. So basically, we were guaranteed that we would have 97 percent of our capacity available at all times. The other important thing that that allowed us to do – because they had that ability to regulate it, they would not have to bring us down in a case that they needed to shut down the array for any kind of grid stability issues.

They're actually able to just throttle us down, and we can keep 97 percent capacity going forward, which is really critical in your production over the life. Next slide, please. This slide shows you so what's the net result for us? You can see under the blue section, that is actually what our demand was on the grid power prior to implementing the – having the array go live. Our array went live 2-1/2 years ago. You can see now in the several months that we're activated, this continues to this date, we actually have reduced our demand dramatically.

We actually are now sitting at over 50 percent of our power coming from the solar array. And there are times, as you see when it hits the gray bar, we are actually off the grid entirely, which is really, really important for us. Our realized annual savings from the solar project range from $85-$100,000.00 a year, and that is based simply on what the demand cost is on the grid power, again. So as power's come down a little bit because of the petroleum prices, that's scaled back to $85, but much like Wolfgang, we have a fixed price agreement for the next 20 years, so we're confident that that number's gonna continue to grow over time. Next slide.

Okay. One of the things that came out of this – and this is where partnerships can become very important – because of our ability to work with SolarCity, and particularly with the utility, with Exelon, we were able to leverage that partnership when Exelon came back to us and wanted to know if we'd be willing to explore a battery project on this campus as a demonstration at no coast to the college, and that was because we showed them that we were willing to partner with them. We were willing to be flexible in what they needed for design considerations in our solar project.

So where we are in this project, currently we have one megawatt storage on campus – that's Phase I, that's up and operational. The next phase is to get us to two megawatts total, and then microgrid

the entire campus. Next slide. The reason we're interested in that, several. First of all, it provides us an alternative short-term power source when grid power is down. Again, we are a rural area, so we rely on the grid or only the solar. What we are able to do with the battery, since it allows us to keep the array up so we will not back-feed to the grid. That's really important.

So for us, it's a resiliency issue; it allows us to keep college operations going at all times. It also increases _____ ability for the partner, in this case Exelon, which again, part of what we've wanted with partnerships is we've got the five partners who are aligned in goals – or have goals that are aligned with us. And the more that we've been able to do that, we've been able to successfully partner going forward. Next slide please. So don't underestimate the value of these partnerships. As you can see on this slide, the estimated cost that was provided by these partners – and you see them all on this chart – was $2 million.

Phase II is estimate it's gonna cost about $3 million at no cost to us, and what we've been able to do is we brought the Maryland Energy Administration in, who's given a $250,000.00 grant, plus the battery was actually paid for by Pepco as well as Samsung, who's the battery producer. So again, they see this as an opportunity for themselves to market this technology out to larger space. Next slide. Other things that we've done, 'cause not everything is large scale. The other thing that we've done is we've taken the opportunity when we do building renovations to look at sustainable options.

We've got geothermal HVAC throughout our campus. We have recently installed a high efficiency chiller, which had a 30 percent power savings. The additional cost for that higher efficiency was about $20,000.00 for us. The estimated annual savings is gonna be about $12,000.00 a year, so our break-even period is less than 2 years. This was an easy sell for us back to our state agencies to help provide us funding, because they can see the life cycle cost, share the reduction in the life cycle cost. We've also moved to just re-lamping our pole lights outside, and what we're doing here is only replacing the heads and the bulbs.

You don't have to replace the whole light. The technology has changed so much, we're actually able to do that now for less than $80.00 a pole. We save $62.00, so our break-even period, not considering the cost of any saved replacements 'cause of the longer life of the LEDs, is actually less than 15 months. What becomes of that, we're able to fund this right straight through our operating budget, so we're not even needing any more a capital budget for

these kind of items. We've moved to scheduling all of our buildings on campus.

Since we're a smaller institution, when we get into slower times such as the summer, we bring buildings off-schedule, off-line, and into a maintenance schedule, and we push our classes into buildings that are special use that we know have to be open, so we push our gen eds in there as well, again, to save us energy. That's a no-cost item. And then just several things we've done as far as occupancy sensors, daylight sensors, which is a part of just our normal O&M, as part of those processes which are essentially zero-cost items when we're doing repairs.

Finally, and this was at the suggestion of our faculty and our staff, we've instituted a Energy Star buying policy, where we give a 5 percent preference to products that we purchase that actually meet the Energy Star rating. Next slide. And then the last thing, and this we did early on, we did a lot of education with our faculty and staff. Simple things; turn off the lights when you leave a room. Turn off that projector when you leave the room. Turn off your computer at night. And you can see it's paid off. Everything that we've done from 2011 to 2017, we've actually reduced our total energy consumption by 26 percent for the entire college.

That's resulted in 40 percent savings in energy cost. Our budget in 2011 for electricity was about $600,000.00; today, we're down to $350,000.00, and that number continues to drop as we find more opportunities. Next slide. Okay. And again, just one closing note here. The idea of partnerships carries over onto all of your sustainability initiatives. As I mentioned, we sit right on the Chesapeake Bay, so stormwater remediation is a huge issue here. Cleaning up the Chesapeake Bay has also been a priority at the state level and the national level for a number of years now.

So we, through working with partners in our region who have the same goal of cleaning the bay, we've been able to do over $1 million worth of work on this campus in storm water remediation, stream restoration, and pollinator habitat. And those relationships continue forward, and we continue to look for new projects. What's great about using these partnerships is that they often go out and find the sources of funds. We don't have to. They're the ones who are looking. Their job is to do restoration, so they actually have the relationships with the funders.

So whether it's through Maryland Energy Administration for us for the energy projects, or the National Fish & Wildlife Foundation for some of our groundwater projects, we've had a lot of success

partnering with various agencies. And the last slide I have is just a list of the partners that we've worked with over the last five years, so if you can put that up. And you can see – and again, what we've been able to do is really leverage all these partnerships, bringing the resources where needed. They often – now we've got partners coming to us and saying, "Hey, wouldn't it be cool to do this? Wouldn't it be cool to do that?"

And they understand that the economics have to work for us, and they do; they often do. And it's an easy sell once you get to that. At this point, I'll turn it back over. I know we're getting close to being out of time.

Joe Indvik: Awesome. Thanks, Tim. Well, we do have five minutes left for questions. I've gotten a few questions here, so I think we'll probably have time for one per panelist. So starting with you, Jesse, you mentioned that you have a revolving fund backing the Delta Force activities. I'm curious about what you see as the value of having a revolving fund rather than – what would you say to folks who just wanna make a traditional one-time capital investment, or what's the benefit of a revolving mechanism?

Jesse Warren: Yeah. We've looked at that on the financial spreadsheet a million times, and what it comes back to is we wanna have a fund that has the ability to grow. So whether it's taking that initial seed money and rolling it into the $15 million worth of investments that we've done, or something more traditional, where maybe a loan could be granted, but then that additional 25 percent would be seed money, could both be valuable. I think the value in doing so is autonomy. I mentioned that I'm an energy engineer, and I came from private industry.

And coming to work for the state, I was afraid that I would have my hands tied with respect to projects; it would be funding requests and budget this. In reality, the Delta Force model lets us move ahead as long as we've got cash in the bank.

Joe Indvik: Awesome; thank you. For Wolfgang, actually a two-part question for him – I'm gonna combine two questions we got. So the first was in terms of the process you use to bid out the solar project and the associated PPA, where did you guys get your inspiration for that language? Did you use a template, or have someone on staff who had some experience with that – how did you get started on a all-PPA process? And second question is, have you had any interest from drivers to charge electric vehicles from the solar panels?

Wolfgang Bauer: So the process that we used started with finding an integrator that helped us with the bidding process, and they actually developed the contract template; and it was basically all their legal department and our lawyers looked it over and said, "Yeah, that's okay." So it was all, in our case, it was CustomerFirst Renewables that did all the contracting and the contract language for us. And then once we had awarded the winning bid, they helped us still through these final contract negotiations. The EV charging, yes; we have more and more charging stations. Basically every quarter we look at how many requests are there, and then we fulfill them as good as we can.

Joe Indvik: Great; thank you. And finally Tim, I mean getting to 50 percent renewable and at some points being completely off the grid as quickly as you did is pretty impressive, so maybe the answer to this is, "Nothing." But if you could start this process knowing what you know now, what would you do differently to streamline and improve the PPA process?

Tim Jones: Well, I think what we would do differently, and I'll say this; I don't know that there is a lot that we would do differently. I think we did a good job with that. Here's what I'll say. We spent a lot of time researching up front, and I think that was the key, so maybe I'll answer it that way. We spent about a year developing what our requirements were gonna be, because we knew whatever came out of this, we had to live with for the next two decades. And so be mindful – we were mindful of what requirements there were in the state.

The thing that would be nice to know, which is almost impossible for any of us, is what's the future gonna hold, and that's really difficult, right? We're still grasping. Our next goal is how do we get actually to our 100 percent renewable, and we're thinking battery technology, which really wasn't discussed while we began this. It would've been nice to have done a little more research on that end, because we just assumed up front that 100 percent was gonna be hard, so we were happy with what we started with, 40 percent, which we've now gotten over 50 percent through energy reduction.

So I guess what I would do differently is look at what other technologies you can gather together with this to maximize that ability to move to more sustainable resources.

Joe Indvik: Okay, great. Yeah, great answer. Okay, well, I think that's all the questions we have time for. I have a couple quick slides just to close us out here. So we have compiled three case studies from

these three institutions. If you'd like to read the longer-form version of some of the things we heard about today, you can go to these links here. These are on the Better Buildings Solutions Center, which if you're not familiar with it, is a large database with many different case studies, resources, best practices, and a whole bunch of other information about energy performance and building.

And if you go to the next slide, this is the contact information for myself, Joe Indvik, my colleague, Holt Mountcastle, and together we run the Better Buildings Financial Allies Program, so again, if you have any further questions about financing, please feel free to shoot us an email. I'm gonna have John and Nate here as well, who run the Higher Education Program for Better Building. So with that, I'll leave this all open for a couple of seconds, but I think we are ready to close it off there. So thanks again to our panelists and have a great day.

[End of Audio]