Holly Carr: Hello, I'm Holly Carr with the US Department of Energy. I'd like to welcome you to the Better Buildings Webinar series. In this series, we profile the best practices of Better Buildings challenge partners, Better Buildings Alliance members, and aligned organizations who are working to improve energy efficiency in buildings. Today, we'll be focusing on the future. We'll speak with a staff member here at DOE to understand how DOE works with stakeholders to prioritize new technologies, and evaluate their potential to reduce energy use in the commercial building sector. We'll also hear from one of our Better Buildings Alliance members who is completing a technology demonstration project with us and putting some of these new products to the test under real conditions to confirm energy savings.

And finally, we'll provide some details on the newest class of prioritized technologies for which we will be seeking demonstration sites in the next year. We hope you'll take a look at these new technologies and see if there might be a good match with your building portfolio. So let's go ahead and advance to the next slide and the slide after that, actually, because we'll start off by introducing our presenters. First off is Amy Jiron. She has been with the US Department of Energy for five years working on both the management and application of energy programs of state and local governments through their weatherization and intergovernmental programs office, and on the acceleration to market of high impact commercial building technologies with the building technologies office.

And that's the part we'll focus on today for work. Prior to her work with the Department of Energy, Amy directed the day-to-day activities of the US Green Building Council Colorado chapter and evaluated, commissioned, and verified building energy efficiency strategies with an energy consulting firm and an energy services company. Amy received her Juris Doctor from Washington College of Law in Washington, DC, and earned a bachelor of science in architectural engineering from the University of Colorado in Boulder. You'll see Boulder is well represented in this session today.

As our next presenter is Kathy Ramirez Aguilar, who manages the CU Green Labs program at the University of Colorado Boulder, a program she has been building since 2009. Kathy has a doctorate in analytical chemistry from the University of Colorado Boulder, a BS in chemistry from the College of William and Mary, and 15 years of laboratory research experience within the fields of biochemistry, analytical chemistry, and organic chemistry. You

can also send in your chemistry homework questions to Kathy during the session. Working with – as a research scientist, she saw a real need for a program to engage scientists in conservation, and the birth of her twin daughters ignited her passions to promote change and create a program focused on resource conservation in labs, which can serve as a model for other campuses to adopt.

So thank you both for being with us for our session today, and before we get started with our presentations, I want to remind our audience that we will hold questions until the end of the hour. We hope to have a good bit of time at the end to answer any questions you have, and you can send them in through the chat function on your webinar interface. Also please note that the session will be archived, so you can kind of sit back and enjoy the show, and all of the details will be posted to our website, both the slides and the audio later on. You can access them as you need to.

With that, let me go ahead and turn it over to Amy Jiron, who will describe our High Impact Technology Catalyst program here at DOE. Amy.

Amy Jiron: Great, thank so much, Holly. Can everybody hear me okay?

Holly Carr: Yeah, I can hear you.

Amy Jiron: Okay, thanks. So this is the High Impact Technology Catalyst team. As you can see, there's a lot of brain power behind this program, and it is really the first year that we have it up and running. John, you can go ahead and move forward two slides. Really what the High Impact Technology Catalyst is about is catalyzing the adoption of commercial building technologies that meet a specific criteria for our deployment efforts, and of course we're looking at energy, but we're also looking at the interests that we see out there from those of you working on the day-to-day initiatives in buildings.

And so of course we have to consider all the different audiences that we engage with and all the different means by which to reach you all in order to catalyze the adoption of these technologies. So John, next slide. I'm just going to run through a sort of organic example of how we've done this previously. Rooftop units. So these are some of the criteria that we know we have to focus on, and of course we're going to look at energy, but we're also going to look at the marketplace for rooftop units, and how much energy we can save based on the technology available on the market

today. So with RTUs, we know that we have about 40 billion square feet of commercial building floor space.

Nothing to scoff at there. That consumes 2.1 quads – quadrillion BTU of primary energy. That's a significant portion of the commercial buildings footprint in energy consumption. So check that one off the list. Next, we wanted to look at what the marketplace was doing with RTUs and what is the state of RTU in the marketplace currently, and I think we all know that there are a lot of RTUs that are past their typical life that needs to be replaced, or that are functioning at a lower efficiency than they could be based on new technology that's out there for retrofitting.

So check that one off the list. And then we looked at what is the opportunity for saving based on the current state of technology. And what we found is that with new progress that's been made in the past few years, new emerging technologies and yet available technologies that we were looking at 200 to 300 trillion BTU per year at maximum penetration. So check that one off the list. So what do we do with that? And I think that is the big question here. What do we do with the information that we've gained on these technologies that we look at? And for RTUs, what we did is we worked with manufacturers and stakeholders, like you who are most likely end users, to develop a new specification to drive technology to even more efficient levels.

And we launched the advanced RTU campaign to increase adoption of existing efficiencies that are out there. So the RTU challenge specification driving new RTUs to an 18IEER, which is about 50 percent better than what we believe is the current install base right now, and then of course driving technologies through the advanced RTU campaign where we have participants commit to retrofitting or replacing with high efficient RTUs or retrofitting with advanced control technology. So this today has been a very successful campaign.

We've seen over 30,000 RTUs retrofitted or replaced through the campaign, and we have at least five new challenge units or challenge specification compliant units coming into the market now. So again, one example of the process that we're looking at – next slide. So putting it all together, we have this program called The High Impact Technology Catalyst, and what we're really looking at is identifying and prioritizing cost effective underutilized or emerging energy efficient technologies so that we can better focus our resource development and activities around market transformation.

And what we do is basically look at how what technologies are out there, how do we evaluate them, what do others think about these technologies, do they meet the criteria for market transformation, and then look at how we can work with our target market and audiences to deploy them. Next slide.

So the first step that we did was identify and evaluate a giant list of technologies, 400 to be exact, 400 or more, and what we did is we research what technologies are out there through a variety of efforts listed here. We then did an initial screen based on energy savings, technical energy savings, and the commercialization status of the technologies. So are they market ready, are they near commercialized, are they under utilized. And then we did a whole series of workshops to evaluate the list, and our screening rankings based on that. Then we will look at all of these four different opportunities for deployment, including manufacturers' challenges, technology demonstration, technology specifications, and campaigns. Next slide.

I'm going to explain what those are in just a minute here. So once we have our list, which we've done through peer workshops, through RFIs, through market research, we look at what we do with the technologies that we've identified as the highest likelihood of making an impact in the marketplace, and then we take those technologies, identify the end goal – so what we want to get out of our work with these technologies - and we determine what the activities should be around them. So we have these three here.

Tech demo, technology procurement, technology campaign. Through a tech demonstration, basically what we're doing is trying to prove out the benefits of the technology and maybe identify some of the market factors that are underlying slow adoption or underutilization so that we can help overcome those barriers and move them out into the market faster. Technology procurement specifications are out there for you to use to use for apples to apples comparisons, and also to set policies with the newer organizations to improve the efficiency gains that you see by using technology.

And then technology campaigns are really the last step on the pipeline of technology where we are looking at seeking out commitments from our partners and the adoption of these technologies. Go ahead, next slide. So this is another example of some of our HIT work. This is the exterior lighting example, and

what we did is really work through the pipeline, so we started out with emerging technologies work in LED exterior lighting. We demonstrated that through the Caliper Program, which is part of this solid state lighting program. We launched the Lighting Energy Efficiency and Parking campaign still running right now.

The ultimate result was more than meeting the goal of 500 million square feet of exterior lighting retrofitted in the United States. So I think this is a great example of how we can push a technology from development through market adoption more rapidly based on this sort of proceduring and step-by-step process called the HIT Catalyst. Next slide. So once we have – our first step is to create a matrix, or our first step was to create a matrix where we evaluated 400 measures, and we looked at two different screens, and then we ranked all of those different technology measures.

The next step was to workshop those technologies with a variety of different stakeholders, including academics, federal agencies, other federal agencies, our own federal agency, utilities, and regional energy organizations. In total, we workshopped 50 with 25 unique organizations and 50 different individuals. We will be launching an RFI for next year's list, so keep your eye out for that coming down the pipe there. Next slide.

From our workshops, we heard a variety of different inputs, but nothing really too groundbreaking. I think we all understand that these bullet points here are very much part of the market today, what you're dealing with in your day-to-day interactions with buildings, and I think that this was verifying to what we had done so far, though of course with technology, sometimes it's just about widgets. It's about how you group technologies together and apply them as packages to maximize your energy savings, and of course controls in data. There's a lot of it out there, and it's confusing. There are many choices. There's proprietary information, and so the need for guidance in the controls and metering and data information space is high.

As far as operational relations, those are really the kind of market factors that we look at in regards to implementing technology. And then also, of course, looking at what the real use of technology is compared to the ideal use, so what's happening in the lab versus what's happening in real buildings, what's happening based on predictions versus what's happening when you actually install it in several of your portfolio. And then also, enabling technology can make great strides, and I think we've seen this in the last year with some of the Better Buildings challenge

partners. Information is as value as the technology, and so without understanding what it is that you are implementing, you really cannot verify the value of it.

And so getting that information on how technologies are using energy, how technologies are performing, how they interact with other technologies in other systems within a building is as important as the technology itself. And I think probably the most important piece for our presentation today is that there can never be too much independent third parties demonstration data. There's a lot of I guess there are a lot of claims out there, and so what these third party demonstrations do is help us verify what those claims are, and also help you better manage the expectations around the technology that you choose to implement. Next slide.

So this is the list for this year that we came up with based on all the criteria and all of the process that I outlined earlier. These are five technologies that we're going to look at. Actually, six, and as part of the next step, we will be doing exactly what I talked about with in terms of looking at outcomes and how do we best get to those outcomes. How do we work with all of you to move from step to step to step to get this technology from under utilized or emerging into full market adoption? I think there's a lot of really great working going on in this area already, and there's a lot of really great work going on with all of these technologies already.

So I encourage you to reach out if you have interest in any of these areas moving forward so that we can work with you on either adoption or developing policies or identifying campaign opportunities or however it might be that you're interested in participating. Next slide. So what happens now, we have a list. We've done our workshops. We've done our prioritization and analysis, and now really what we have to do is another set of evaluations where we look at the end game and try to get to the end game as fast as we can.

At the end game, we really hand it off. We hand it off to prove out that market adoption is at the right level so that we can get to voluntary programs, incentive programs so that we can keep that whole momentum going forward, or we move back to development. In come cases, I think technologies do need to go back and – because there are factors we can't overcome, those need to be addressed, and we need to start back through that whole process again with the better maybe option. Next slide. And we're going to do this every year, so that's why we have an RFI coming out this year. We had an RFI that came out last year, we have a list

this year, we'll modify that list for next year because we want to make sure as technology changes, that as the market changes, we are updating our process and our evaluation accordingly.

Of course, all of the better building partners, all of the better building programs are key to this effort. Of course, all of you, all of the better building sort of community help us drive these technologies, help us drive the energy savings, and I think we work together in getting to the goals that we're looking at. So as I mentioned before, we look for your input on any of these technologies, any of these options moving forward. Next slide.

And then there are a couple of different opportunities for engagement. One of them is going to be at for a tech day at the Better Building Summit at the end of May this year. We're going to be bringing in representatives from all the different federal technology demonstration programs or technology deployment programs to talk about how their program fits into the larger technology framework, especially related to buildings of course.

We're going to be talking about innovative technologies that are in the market now, so we're going to get some updates on the demonstrations that are happening currently, and we're also going to talk about some of the projects that we have in the pipeline that are near commercialization but very exciting, and I think you're going to be excited to see what's coming that you're going to be able to benefit from and creating energy savings out there and driving better performance of your building. Next slide.

And that is it for me. I'm going to turn it over to Kathy to talk about ultra low temperature freezers.

Holly Carr: And Kathy, I'm going to jump in for just one moment before you get started. Thanks, Amy, so much for your overview of how we make the selections on these technologies and DOE works with folks to figure that all out. I do want to remind folks that you can ask questions. We've gotten a number of good questions from the audience already, and I encourage you to send those in through your question box on the webinar interface, and now we'll turn it over to Kathy at UC Boulder for the story of how the university has tested one of these technologies in the field, and also what you found. Kathy.

Kathryn: Great. Thank you so much, Holly. Yes, can we go to the next slide? So at the University of Colorado Boulder, we were approached about participating in this ultra low temperature freezer

demonstration project. There are a number of ultra low temperature freezers on the market with energy efficient claims, and so this was a project to act as a third party evaluation of energy use of some of those freezers. The study was actually done under field conditions, so in lab environments or lab equipment rooms, and data was collected not only in the freezers of interest, but also nearby freezers in the same room without energy efficient claims as comparison units. Those comparison units have to be newer in age five years or less. So on each of the freezers, the freezers of interest in the study and the comparison freezers, electricity use, interior and exterior temperature, door openings were monitored for a period of about five months.

And obviously, the intent of the study was to provide information to purchasers looking to buy energy efficient ultra low temperature freezers and to continually move the market towards energy efficient freezers. Next slide. So as the University of Colorado Boulder Green Labs program, we certainly were interested in helping out with this project. We were well aware of the need of market change towards energy efficient lab equipment, including ultra low temperature freezers. And ultra low temperature freezers have been a focus of the CU Green Labs program on our campus. We have about 150 ultra low temperature freezers at CU Boulder, and we've just – the CU Green Labs program has just become known as the freezer people at CU Boulder. We've run three years of –

Over three years we've run three different freezer challenges. We've helped the labs with developing emergency backup plans for those departments with ultra low temperature freezers. We offer incentives for making energy efficient choices with freezers. We'll help labs set up sharing of ultra low temperature freezers between labs to minimize plug load, but also to avoid the cost of buying a whole other freezer for scientists. We also have mobile minus 20 freezers for loan to help scientists defrost, do sample clean outs, or to use in times of emergency when they have a freezer failure. So this project was just a natural fit for us, and we certainly wanted to help out. Next slide.

So what was required to participate? What do we need to do on our campus? First, I needed to get permission to take time out of my schedule to work on this project, which was a simple ask since it's so related to what I do already, but then there was a need to locate the best places to carry out the study on our campus. You know, as I mentioned, we've become the freezer people on our campus, so I do have a general knowledge of where ultra low

temperature freezers are located on our campus. We've also done a lot to engage scientists with conservation related to their freezer. So all that helped us figure out – well, be able to identify where those best places would be.

For example, in our integrated physiology department, I knew we had one of the freezers of interest, and it just happened to be located next to a freezer that fit the comparison freezer requirements. And so really, it was just an ask of the department and the scientists that they were willing to participate, which luckily they were. For the – we had two sites on our campus, so that was one of the sites. For the other location that we helped set up, the freezer manufacturer was loaning us a freezer because we didn't have that freezer of interest on our campus, but they wanted to participate in the study, so they were willing to ship a freezer out to our campus to participate.

And thus, we needed to find a location to place that freezer with a good comparison freezer next to it. And in a lab where the lab would allow the monitoring, but also allow another freezer to move in and take up room in their space or in their lab equipment room. So we were successful. We had a number of locations that we had found, but one of them in particular we were successful in lining up with our molecular cellular developmental biology department.

And so we had our sites, but of course – and we work to get all the permissions from the building managers, from the scientists involved, so we did all those asks, but we also had to work with our campus legal, which only took about a few weeks to get documents through for both doing the study on our campus with Navigant – Navigant was doing this for DOE. But also then we also had to work with our legal department with the contract for the loaner freezer that was going to come to our campus.

But that went pretty smoothly. We did – CU Green Labs did have to act as the responsible party for the loaner freezer. We also acted as the party that brought in Navigant to show them where the sites were that they were going to set everything up, and we oversaw everything to make sure everything went smoothly, and that the freezers of course after the setup was done were still operational. So we took on that responsibility as the program that was helping with this on our campus.

Also, since these were freezers that were actually in use, all except for one of them which was a loner, but all these freezers were in

use. We also had to be available to troubleshoot issues. There were times where a probe – there was one time where a probe fell out because the scientists were going in and out of the freezers, and one of the probes got knocked out. So being able to be that point of contact to help Navigant when something was going wrong with the monitoring, and also to be the point of contact for the scientists on campus so that they could reach out to someone to know what was going on, why was this equipment in the freezer rooms, and being hooked up.

So next slide. And so this is a slide that I got from Rebecca Legett at Navigant, and it's a summary showing the results of the study. As I mentioned, we had two sites, so we were Demo 1 and Demo 2 there. Demo 1 was the Sterling Ultra Cold SU780 UE, and Demo 2 was the Eppendorf HEF U570, both upright freezers. Those were the freezers of interest on our campus that participated in the study. As you see, the red line there is the average of all the comparison freezers that participated in the study, and so as you can see, each of the demo units are consuming less electricity than the average of the comparison units.

Demo 3 took place at Michigan State University. Next slide. And one of the fun aspects of participating on this project was that we were able to take the project even further than what originally was the intent of the project. All the monitoring, it was intended to happen at negative 80 degrees Celsius. But one thing – one effort that we've been working on on our campus has been raising the temperature of our ultra low temperature freezers and encouraging scientists to do that if they feel comfortable doing that. So we have now about 50 percent of our ultra low temperature freezers on our campus at negative 70 degrees Celsius rather than negative 80 degrees Celsius.

You can see some of the signage on this slide that we have used with those efforts. But anyways, yes, so we were able to take the freezers that were already hooked up to the monitoring equipment and change the temperature on three out of the four units. In fact, one of them had actually been at negative 70 before the study started, so in order to participate, that freezer actually had to have been cooled down to negative 80 again, so it was no big ask to have them go back to negative 70. But what was great about this was it gave us another opportunity to get other freezers at negative 70, and this other freezer right next to our Demo 2-1 that was acting as a comparison unit, they had never been at negative 70 before, but they wanted to help out with this, and so they did.

They raised the temperature of their freezer to negative 70. But this enabled Navigant to get metering data at both negative 80 – negative 70, which they've been able to include in this study. Next slide. And so just some thoughts on the experience of participating – well as a participant in this demo, I found it to be a very positive learning experience for our program. There were many pieces that had to fall into place to enable it to move forward, and you know, if we had gotten no from any one of those stakeholders, then that would have stopped the project.

But you know, fortunately, we were able to get yeses from everyone involved. And one thing that helped with that, as I mentioned earlier, we've done a lot to engage our scientists in conservation in our labs, and so we were working with two of our most engaged departments. And so they were very willing to participate, and they wanted to help. So that engagement piece really helped us get those labs signed up to participate in this. It did take more time than I thought to get this all set up, which is a common thing.

But I definitely feel that it was worth our time to help with this project because I know – I attend I^2SL, International Institute for Sustainable Labs Conference every year, and I know that these type of items do influence market change for lab equipment, so I definitely felt like it was worth our time. That's it for me. Next slide.

Holly Carr: Okay, thank you so much, Kathy. A number of you have sent in some technical questions about the technologies that we're looking at through the HIT Catalyst Program, and details about the technology demos. We'll try to get to as many of those questions as we're able, otherwise, I encourage you to reach out directly to Amy and Kathy. We'll have their e-mails available at the end of the session, and I encourage you to reach out directly to them with some of the technical questions. At this point, we're going to turn back to Amy. She gets an encore performance on this webinar. And she's going to talk about – give us some more detail on the newest class of high-impact technologies that have been selected and the six products or technologies that we're planning to look at over the next year or so. Amy, can you tell us about them and what our opportunities – what opportunities are out there for our audience to perhaps help test them out?

Amy Jiron: Sure, yeah. Why don't you move onto the next slide? So these are our new technology demonstrations that are currently underway or just getting started, and some of the first steps that we have

underway with the technology demonstration projects are to map out the plans. So we have three-year agreements with each of these organizations to roll these out at various sites with third-party measurement and verification through our national labs. So I think the project results will be very, very valuable to anybody looking to implement new technologies that are highly energy efficient.

The first one that we have here is an intelligence scrubber module, or a HVAC load reduction module, and this comes out of enVerid systems. It's actually a nice demonstration of the pipeline that we have. They've received a couple of rounds of federal funding, all the way from working with directly with the national labs with working with some of our other earlier development programs. And what this is is a retrofit application to any sort of return error system. And it helps to create better air quality in the beginning so that we don't have to recondition outside air.

Specifically, it can remove carbon dioxide and DOCs from the indoor air rather than offsetting with 100 percent or even less than 100 percent outside air. Initial demonstrations have shown pretty good energy savings, 40 percent at peak – and at peak load, peak cooling load. And also, some initial results have shown that indoor air quality is improved. So this one is a good demonstration of what we can do by removing contaminants from air rather than supplementing with outside air, which can be very humid, very hot, or just the wrong temperature. So anyway, that is – I'm really excited about this one. It's a great team. Thank you to the whole enVerid systems team, we're looking forward to working with you and moving forward.

And I hope that we can seek out some good partners through the Better Building Initiative to do these demonstrations, and I'm going to have information about how to engage that way coming up in a minute. Next slide. So we have five new technology demonstrations that are happening. This is the second one. This is one with Building IQ, and actually, this is a partnership with the General Services Administration. GSA had selected this particular platform for a demonstration through their Green Proving Ground Program, and they also collaborated with us on our work with the technology demonstration.

And so we decided to while in this demonstration, add some commercial component to it along with GSA federal buildings component, and then of course, building IQ brought Schneider Electric and Siemens to the team to provide the performance contracting services. So what the technology is here is predictive

energy optimization, and it's looking at portfolios of buildings or just one building, and using modeling software along with data from the building automation system to identify organization opportunities, and also demand response opportunities. Again, another great team, very strong partnerships with Siemens and Schneider. The District of Columbia GSA, I think that this will show us some very good opportunities for not just energy savings, but also demand response without having people come into the building and doing a major audit.

So initial savings opportunities showed about ten percent HVAC energy and five percent peak load reduction. We're looking at demonstrations – I brought our portfolio buildings and our other typical demonstrations because it is a portfolio sort of approach. Thank you to Mike Zimmerman and all of the Building IQ team for providing the slides today, and also for working with us. As I mentioned, this one is a partnership with the General Services Administration, so we're a little bit ahead of the game on this project, and moving us faster to – we've already identified demonstration sites with not only just the District of Columbia, but also through GSA.

So next slide, please. The next technology demonstration is a little different because we are partnering with the Northeast Energy Efficiency Partnership to demonstrate advanced light and controls for commercial buildings, and what they're going to do is work with their utility partners, and also manufacturing partners to develop the needed market – market solutions to overcome some very specific identified barriers that they have submitted to us as part of their program. I think we've heard a lot of, "Don't demonstrate lighting control," over and over again. We hear that loud and clear, but this is really geared towards how do we overcome the barriers that have prevented this technology from moving forward in the market to date.

So they're going to be looking at ten demonstration sites across the northeast region about 40,000 square feet per site. That won't start happening until around next year because they are going to be working through a protocol to select the specific packages of lighting control technologies that they will be demonstrating. The new team will be releasing on a request for qualification for this particular project. That will be on the NEEP website this month, so please check that website out if you have at all have any interest at all in submitting a product to be demonstrated as part of this program.

Thank you to Dave and all of the new team, again, for partnering with us on this. It's going to be a great project. I'm looking forward to it. Next slide.

Okay, this one is combined heat and power with AO Smith, who I don't think you normally associate with – combined Heaton Power, which was I think one of the most intriguing aspects of this project. Their goals here are to verify that we can get to a three-year payback installed, which is I think quite a lot better than maybe what you've seen with CHP out there so far. And just to let you know, this is a micro-CHP system, so these are applicable to commercial buildings with a 3,000 gallon per day load of hot water. Their targeted sectors are northeast, Midwest, California, restaurants, hotels, healthcare, and multi-family housing.

They're going to be working on simplifying installation and also training for installation and service personnel. Again, thank you Chris and the whole AO Smith team for working with us. This is a great project under utilized technology rather than emerging maybe, offering great energy efficiencies because we're sticking up some of those losses, and we're using them to create more energy. Next slide. And last, we have a motor demonstration, which is very simple. It's just motors for a refrigeration display case system.

But it's an ultra-efficient motor that's emerging, coming out of QM Power, which is the provider of this technology for the technology demonstration. They are working directly with an OEM, so we should see those as part of the packages for the display cases coming soon. We will also be demonstrating a lot of fan motors and at least 50 different grocery store sites throughout the US. There's a huge opportunity here – about .6 quads for a billion dollars of energy savings. This is one of the HITs from last year, so we were looking at refrigeration systems particularly, and we will continue to look at refrigeration systems.

You can see from the hit list I presented earlier that open display case retrofits and other refrigeration efficiencies are one of our high impact technologies that we identified. So really looking forward, again, to this, and thank you to the whole QM Power team for working with us, and looking forward to the results of this project as well. Next slide.

We also have several other real building technology demonstrations underway or field tests. We are looking at alternative refrigeration systems, multi-load washing machines.

You saw the ultra low temperature freezer demonstration results. We'll have that report out probably at the end of this month. We are looking at daylighting and controls retrofits and office parameters in New York City called the Living Lab Project. The gas unit heater demonstration for warehouses particularly, that report will be out at the end of this month as well. Heat pump water heaters, LED down lights. We have that case study up on the Better Buildings Alliance website already. Of course, RTU challenge units showing exceedingly good energy savings, around 40 percent due to efficiencies gains there, and then add on the controls with automated fault detection and diagnostics to see incredible energy savings really through those retrofits to existing RTUs.

So for more information on these, I'd encourage you to visit the HIT Catalyst website, and John, if you want to go to the next slide, I will point to all of the different resources. Oh, sorry. So here's the information for you if you're interested in participating in a real building demonstration. These three current projects are looking for these particular criteria in sites. The other two projects are still in planning phases, and we'll be looking for sites next year. So I will refer you to the slide deck later, and please feel free to reach out. TechDemo@EE.DOE.gov. For more information on any of these, we do have a criteria selection checklist for each site that we look at.

So we'll be looking at a lot more than what's listed here, but this gives you a glimpse into what a site would look like for these demonstration opportunities. Next slide. Okay, now additional resources. So all of our field demonstration projects are listed at the Better Buildings Alliance website under activities and demonstrations. We do have a new High Impact Technology Catalyst website. It's going to be improving drastically over the next couple of months, including some of the reports that I talked about on these demonstrations and the results of those demonstrations. We will be releasing a request for information on high-impact commercial building technologies this week, today, actually.

So look for that at Energy – EEREExchange.Energy.gov, also posted at Grants.gov. And of course, we have an exciting opportunity announcement currently active, awaiting submittals from good applications, so I encourage you to visit that opportunity as well if you're interested in working with us in the future. And I believe that that is it for me. Thanks.

Holly Carr: All right, thank you very much, Amy. We now have a few minutes to take some questions. We've had a number of questions submitted throughout the presentations from Kathy and Amy, and I encourage you if you have questions to go ahead and continue to send those in, and we'll try to get to them. Let's see. A couple questions for you, Amy, of the general nature around the demonstrations. First of all, what are the timelines around the tech demos? When are you anticipating that they would start, and how long do they end – how long do they go for? And second question is what does DOE provide in these demonstration projects?

So does DOE pay for the equipment, do they pay for the installation, do they support with the M&V or just one of those things? How does that work?

Amy Jiron: Sure, okay, so I will take the first timeline question. So the timeline is going to vary for each of these, and there's some foundational work that's happening right now, as I mentioned. But the demonstration timeline is usually around a year. I am going to qualify that with that each technology requires a different base lining period, base lining methodology, and also verification methodology. And I wish that our labs had a little bit more about what that looks like. So usually, we're looking at a year, and these will be all up – hopefully up and running next year, those site demonstrations up and running next year.

That will vary of course by the technology. In terms of what we provide, so of course our – the reasoning behind DOE participating in technology demonstrations is of course that these opportunities show great potential for energy savings. So these technologies can produce a lot of energy savings, and so we want to help replicate the results of the technology demonstrations across the country and drive that energy efficiency forward. What we provide – what we are providing on these is support for project management and also third party M&V through the National Laboratories. We do not usually supply equipment – we do not pay for the equipment as part of these demonstrations.

So that is something that we really look at as a way of assessing the real market for the technology. Are building owners willing to put skin in the game, for lack of a better way of saying it, along with the technology providers so that maybe the technology is provided at a discounted cost, but there's still a commitment from both parties and DOE. So hopefully that gets to the gist of those questions the best that I can.

Holly Carr: Yes.

Amy Jiron: Great.

Holly Carr: Thank you. Another question about the results of the demonstration project. So we talk about case studies being produced. Is there a location where folks can go to see – you know, I'm a building owner, I'd like to see what kinds of things have been tested and what the results have been, and if there are technologies I may want to look at my own building outside of actually participating in the demo with DOE. Are there locations or a single spot where I can go?

Amy Jiron: Yes, and currently that is with the Better Buildings Alliance, and all of our solutions will be there always, so it's a great website to visit for all sorts of different pieces of information about technology. Also to access the Better Buildings Technology Solutions Team to share best practices, find out the latest on what DOE is up to, work with our national lab, and other technology experts to make sure that you're making the best choices about technology.

But I would also throw out there that we are launching the High-Impact Technology Catalyst website where there will be information as well. So of course, those will be linking together and hopefully leveraging information off of the two websites so that if you get to one, you will be able to get information on them, different reasons for having two different websites. So but for right now, the Better Buildings Alliance is a really great place to find out information about our previous technology demonstrations, and then the High-Impact Technology Catalyst will be another good place to find out more details about technology demonstrations.

And also, our work in the – with the HITs in what our plans are for upcoming years.

Holly Carr: Great. And to follow onto that, a couple of questions about the selection process through the HIT Catalyst program. So one audience member asked if the full list of 400 plus technologies that you started out with is available to look at.

Amy Jiron: Yes. And so my – it will be. However, it is not currently at this point. And I would also encourage you to look for more information on the prioritization tools that will hopefully become public towards the end of this year as well. So a lot of the

information that we have used in order to screen technology tests come from the BTO prioritization tools, which is an economic analysis tool. Most of the information that we've used, though, is really around the technical energy savings potential, which is out there in a variety of different resources, so we did both a scan of literature, but also we referenced prioritization tools for that. And so I say stay tuned for more information about the technologies that were screened.

Holly Carr: Yeah, and a related question from the audience about the availability of a background report that gives more detail about that analysis, the procedures used to select the priority technologies. Is there any report out there or a description – detailed description of that process?

Amy Jiron: Yes, there is, and it is on the HIT Catalyst website.

Holly Carr: Great. Thank you. I'm going to send a question over to Kathy. This is a question about your freezer test. Wondering if door opening and closing was measured as well as freezer ambient temperature recorded to understanding freezer loading versus power use. This is quite a mouthful. Does that make sense to you, Kathy?

Kathryn: Yes. Sure, yes. Yes, Navigant was on the freezers. Navigant did measure door openings, and also the ambient temperature, the temperature of the room with the study. And so those results – I know that I just showed that one summary slide during the presentation, but those additional results are included in the report, which Amy mentioned should come out in a month, as well as what kind of impact did switching the temperature from negative 80 to negative 70 have. Those type of detailed pieces are going to be in that report that was written up by Navigant.

Holly Carr: Okay, very good. Thank you. We had a question for you, Amy, about technologies that deal with power quality issues, such as harmonics and power factor, which has an impact on energy emphasis. Is this something you all considered?

Amy Jiron: Yes, that is – there are technologies in the list of technologies that we considered that deal with power factor and grid, basically, efficiencies. However, they did not rank at the top of the list, and I think that I would very much like to see more information about those technologies included in our next analysis as grid issues become more and more prevalent across the country. And so I would encourage you to please respond to our request for

information if you have ideas about what you'd like to see or what technology specific – what specific technologies can help us better assess how to deal with those issues.

Holly Carr: And then a specific question about the enVerid product that you showed to us towards the end of the presentation. One of the audience members is asking if there are any code or safety obstacles to reducing outdoor air supply.

Amy Jiron: Yes, that is one thing that we did consider, and that there is an alternative pathway to receive codes compliance with ASHRAE. And that was one of the things that we are assessing. That is fairly normal – well I wouldn't say normal, but that's a good market factor for us to look at during these demonstrations, and also the air quality that we're seeing on the other side of the product. So that's a very, very good question. We did look at it. We are fairly sure that there are ways of overcoming or addressing the typical code compliance methodology through other alternative pathways with ASHRAE. And we will be working on that as we move forward and getting results of the demonstration.

Holly Carr: Great, thank you very much, Amy. We had a couple of questions from folks about – more generally about the Better Buildings Program and becoming – how to become a Better Buildings Challenge partner, how to become involved with the Better Buildings Alliance. I do have a slide in just a moment with contact information for some folks here at DOE, including myself that you can get in touch with if you're interested in participating in the Better Buildings Program. So please feel free to just reach out, send an e-mail, and we'd be happy to direct you to the right places to get involved in those programs. Let's move onto the next slide if you would.

Yes, so I want to make sure that folks are aware of our upcoming December webinar focused on working with utilities to achieve greater energy efficiency. So question to the audience. Are you taking full advantage of the incentive that your utilities are offering? If your utility doesn't offer an incentive that works for your portfolio, have you considered inventing your own incentive and proposing it to the utility? We're going to speak with some of our Better Building Challenge partners who have done things like this to really develop new relationships with their utility. The session will take place on Tuesday, December 2nd, first Tuesday of the month, from 3:00 to 4:00 PM Eastern Standard Time.

Registration is open for that session, and you can access it from the Better Building Challenge homepage or clicking on the link on this slide.

And with that, let's head to the next slide. I'd like to just thank our panelists very much for taking the time to be with us today. Please feel free to contact our presenters directly if you have additional questions about the content of today's session and their work. As I mentioned, if you're interested in participating in the Better Buildings Challenge, you can contact me, Holly Carr, directly at the address shown. If you're interested in participating in the Better Buildings Alliance, you can reach out either to me or to Kristen Taddonio, whose address is also shown on this slide. I encourage you as always to follow the Better Buildings Initiative on Twitter to get all the latest information, and a reminder that this session will be archived probably within the week, both audio and slides, so you can access it at your leisure.

We thank you very much for being with us today, and we hope to see you next month. Bye bye.

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