

Amy Jiron:

Okay. Thanks, everyone, for joining our webinar today. This is a SEE Action webinar on energy audits and retro-commissioning policies. Before we get started, I want to talk a little bit about the State and Local Energy Efficiency Action Network. SEE Action is a network of more than 200 stakeholders led by state and local policymakers and facilitated by the EPA and DOE. Eight SEE Action working groups developed investment grade action-oriented resources and tools to achieve the small goal of all cost-effective energy efficiency by 2020. The Existing Commercial Buildings Working Group released the Energy Audits and Retro-Commissioning State and Local Policy Design Guide and Sample Policy Language document in July of 2013, and we have an all-star lineup here today to talk about the implementation of these policies, as well as tools and information related to audits and retro-commissioning.

Barry Hooper from the City and County of San Francisco will be talking about the guide, as well as San Francisco's Existing Commercial Building Energy Performance Ordinance. Elena Alschuler from the U.S. Department of Energy will be talking about the tools that are available for state and local policymakers. Holly Savoia from the New York City Department of Buildings will talk about New York's best practices and lessons learned under Local Law 87, and Chris Plum from the Minnesota Center for Energy and Environment will talk about his design results and lessons learned from Minnesota's Enhanced Energy Efficiency Program. Next, Barry will talk about the San Francisco experience, as well as the SEE Action State and Local Policy Design Guide. Barry has been an extremely valuable member to the Existing Commercial Buildings Working Group, and I want to thank him so much for jumping in today and sharing his experiences, as well as reviewing the guide for us. Take it away, Barry.

Barry Hooper:

Thanks very much. We'll get right into the next slide, please. I'm going to be talking today both about our experience in San Francisco and then how it relates to the guide, and I really should start by pointing out that I'm fundamentally a pretty minor contributor to the guide and did have the pleasure of contributing. But, nonetheless, the guide is really framed to draw on the very early experiences of a handful of cities that have these audit policies in place and have learned some lessons in both their development and delivery. _____ San Francisco, our requirement comes from a mayor's taskforce on existing

commercial buildings that in 2009 recommended that really data was the fundamental tool that was not being deployed in San Francisco to motivate cost-effective energy efficiency improvements, that we have codes and standards, we have several types of financing available, some great incentive programs where California rate payers invest about \$1 billion a year in energy efficiency, but the fundamental thing that was missing was basic knowledge among building owners, managers, and occupants of their building is performing compared to similar buildings, and what the exact and specific cost-effective opportunities for improvement were.

What came out of that was the Existing Commercial Buildings Energy Performance Ordinance, which really seeks to ensure that all stakeholders in San Francisco would have the fundamental information, a benchmark to know how their building's performance is changing over time in comparison to similar buildings, an action plan that is derived from a comprehensive energy audit or retro-commissioning conducted at least once every five years, and then a modicum of transparency, which we're still actually working on, but the publication of the benchmark data so that prospective tenants and buyers and other parties would have some limited access to energy performance data to inform decision making. The results of audits, by the way, are not to be made public other than the question of whether the building is in compliance with the audit requirement or not.

Fundamentally, the ordinance is a market-oriented piece of legislation that is asking for each building owner to obtain this basic information from the benchmark and the audit or retro-commissioning, but the most important element of it of course if voluntary, it's the acting on that information to undergo capital improvements, improve operations, to work with tenants to squeeze out other operational improvements, and to take advantage of the financing and incentives that are available. So, we invest quite a bit of our time at the city in the discussion and engagement with building owners on those voluntary elements of the program. That's something we try to keep in mind as we move through and help people both meet the minimum requirements of the ordinance and take advantage of it.

I would be remiss if I didn't point out that the city had made the same commitment in its municipal buildings before it went out and began working with the private sector, and have _____ two years of reporting about municipal benchmarks. The city's

portfolio is improving over time _____ this short summary of that, and is performing quite well compared to a number of national comparison points that are available, but also the process of assembling the data about how are buildings performing has been able to help drive investment decision-making and further prioritize improvements in energy efficiency. The reason that we have this type of ordinance – for the next few slides, I’m going to be speaking more to the guide itself rather than San Francisco’s experience.

The reason that the Department of Energy stepped up and included this as one element of their broader effort in the Existing Buildings Working Group was that there is substantial – the whole point of an audit is to uncover the cost-effective opportunity for improvement and looking at just one type of professional review of retro-commissioning primarily focused on operational improvements and ensuring that the building is able to operate as designed, the median cost of that type of evaluation is on the high end, higher than most audits, on the order of .30 cents a square foot, but the typical payback for that evaluation is on the order of one year, so extraordinarily good investment. There’s good data from Lawrence Berkeley Lab of greater-than-ten-percent energy savings in the median building from a thorough retro-commissioning evaluation, and of course there’s similar data about audits out there.

So, what the guide does is provide some sample language that blends what’s both been learned and aligns where possible the language that’s in the laws that are in effect in New York City, in Austin and in San Francisco, and the audience for the guide, of course, is policymakers who may be interested in enacting a policy in their local community or studying the matter. The policies to date have all required audits along with benchmarking, and I won’t be talking about benchmarking a great deal more today because that tends to get a lot of independent discussion, but it really is intended as a direct complement and provides a lot of value in coordination with an audit requirement in each of the three cities. What the guide is aiming to do is really couple together a lot of other work that DOE has underway to enable and support performance-based local and state policies, and I would encourage you to check out the SEE Action website for further details.

When you’re considering enacting or just working with stakeholders on what a great policy solution might be in your community, some of the key considerations when we get to the

idea of a retro-commissioning or energy audit policy of course include reaching out to the right group of stakeholders that can represent the diversity of interests in the real estate community to get a good handle on what the potential benefits are in your community, as well as the complements in terms of related efficiency incentive programs that may be available, and other assets that you have for the community as a whole, and then the benefit of an audit program is better detail about the assets within buildings across a community, and that buildings owners would consistently have a good _____ information.

So, large portfolio owners and managers may have fantastic information, but that is definitely not consistent across all property owners, certainly within San Francisco, and I'd argue with any – it's not consistently available in any community across the U.S. yet. So, assembling that asset information is of value to the individual who assembles it, as well as to the information that gets shared with the city, and also it's able to inform better policymaking, as well. There's certainly a lot of opportunity for long-term savings and improved operations, and a key question becomes what sort of frequency would make sense to require or to encourage an audit or retro-commissioning regime, _____ retro-commissioning measures tend to need some ongoing attention, and they can deliver persistent savings, but it does tend to make sense to have a clear plan for how frequently you're going to review and return back and look for a further round of savings within the building.

It's key when we're talking about audits across the community to look at the workforce capacity to deliver those services, and then there are also a few items which are either being considered in separate documents that the SEE Action working group has been working on, and I'll point out a couple that I've added to the slide. So, for example, the service provider qualifications is a key issue that is covered in the guide itself, and it's the subject of a lot of work at DOE because today communities of course need to require some minimum qualifications for energy services providers so they're able to credibly provide services, and what's happened is communities _____ come to an immediate solution of that problem have tended to recognize a significant and growing menu of minimum qualifications because there are many ways to get into the energy efficiency industry.

There are more paths than just being a licensed professional engineer that have led to some very high-quality professional

expertise. In the future, the guide is very helpful and I personally am hopeful that DOE will complete a national certification program that should be able to help align some of those minimum standards for qualifications. It's key to look at the resources necessary for quality assurance and the process for quality assurance, and that's not covered in a great deal of detail in the guide but the guide does make sure that there are placeholders that the community would have the ability to conduct some quality assurance verification on the audit reports that it receives. There's a balance between costs and comprehensiveness, and these policies are in a type of a large-scale beta test mode. One of the differences between what we'll talk about in San Francisco and in New York does center around the question of – in San Francisco, we are asking for whole-building audits, and then another question is where an audit focuses typically primarily on capital improvement measures and retro-commissioning is of course an operational focus, does it make sense to do both, as in the case of New York City? Does it make sense to give some flexibility and allow your community to choose one or the other? Those are the key considerations in policy design.

Then, last, how is that information going to flow back to the city, and that's not covered in detail in the guide but is the subject of some of the work that Elena is going to talk about with the SEE database, a common platform for energy program reporting, particularly for benchmarking and auditing policies. The standard format for data collection is also up front and center, not covered in detail in the guide. Elena will go into that in more detail, but I would encourage everyone considering any policy of this sort to look very closely at the Building Energy Data Exchange Standard, because by aligning our data collection reporting, it does really help us to align our policies in ways that both make the data more readily comparable across communities but also can aid in aligning some of the details of the implementation of its programs.

Some further considerations that are not in the guide but would be key to look at is how to coordinate with your local utility incentive programs and financing programs, data sensitivity and data handling procedures, the process of exemptions, which are discussed in the guide but really something to think about _____ buildings are able to demonstrate excellent performance _____ exemption, _____ exemption, which is commonly the case in policies to date for financial distress. Are there other circumstances where an exemption might make sense, and then last, it's not in the guide, but really would encourage you to think

hard about innovation, so how may the local energy efficiency marketplace change subsequent to the adoption of the audit. As an example, the idea of remote audits has only become quite a bit more credible in the last two or three years, and definitely subsequent to the adoption of the policies in San Francisco and New York, and it raises some interesting questions for each of us.

So, looking at the sample language, there's a section about audits. It's very similar to the way that the policy language flows in New York City and San Francisco and Austin. It refers to the ASHRAE procedures for commercial building audits. It's worth noting, however, that those procedures are the only tool that are available and that ASHRAE is working on SPC 211P, which would be an audit standard. It's written more specifically for code or policy language, but it wasn't available for San Francisco, New York or Austin, and won't be available for at least a few more quarters but it would be good to put in a placeholder to be able to recognize that if and when it's available. Most communities ask for a more detailed audit for larger, more complex buildings. The most common threshold for that is 50,000 square feet. As we talked about before, it's key to look at what the minimum qualifications for an auditor must be and to provide some room for that to grow or to mature in the future, and then to detail exactly what the community is looking for in an audit report.

Retro-commissioning, you deal with some very similar issues _____ ASHRAE standard 202, and that's one great resource to refer to, and the policy itself, though, concludes quite a bit of detail about what should be included in retro-commissioning and the retro-commissioning report. Similar issues with the audit are qualifications and then some further detail on reporting. Then, the question becomes what should go to the city, and this is something that's been a little bit different in San Francisco versus in the guide. It certainly is incumbent on the community to provide a format to define exactly what must be submitted, and it's been most common to implement policies with a rolling deadline. It could be based on square footage, as in the guide, and there are some other models out there in the wild, and then, as mentioned earlier, there are a number of reasons that communities _____ recognized to date and are included in the guide. That would be potential exceptions for requiring an audit, particularly if a building is demonstrating excellence in energy performance and it's been third-party verified. That's a very common source of exemption. For more information, I would refer you to the guide itself.

So, thinking about how this has been applied in San Francisco, where we did have a policy before the guide, but it really was an interesting, helpful exercise to go through. We do collect data via online form. The building owner does receive a very detailed audit that is not defined in extraordinary detail other than, of course, the reference of ASHRAE procedure _____ somewhat expected there. The city then receives what's called a Confirmation of Energy Audit _____ limited summary, and we subsequently will also collect the full audit report for QA review when various conditions trigger that. The emphasis in reporting, the city is verifying that there are actionable EEMs that have been identified by the auditor that the preliminary energy use analysis included review of the data in Portfolio Manager, so it becomes a complement to the benchmark policy, where the auditor is providing an additional third-party validation of the benchmark data where those buildings have not been participating in LEED or ENERGY STAR. I would be remiss to not point out that this fundamentally is a beta version which we're looking to upgrade in the very near future, hopefully in coordination with the SEED rollout one or two quarters from now.

A couple examples in San Francisco. The Flood Building was a historic landmark that had done quite a bit of energy efficiency work over the years, and the ownership was definitely not convinced that the energy audit would be a valuable thing to undergo but they did so nonetheless, and they found more than \$1 million in savings in the building and acted on that information. It's their early leadership example from the policy. Fundamentally, our question is how to engage with and support further decision making in that direction and that can come from a lot of different private-sector parties. But, fundamentally, I view the policy as opportunity to build relationships with building stakeholders in San Francisco and to leverage what they've been doing and how they've been investing in their buildings.

Some early data is included on the right-hand side. The net present value of the first 120 Level 2 audits submitted to the city identified more than \$2.00 in value in square foot from energy efficiency improvements. _____ looking forward to working with DOE and also with our other stakeholders on getting some of those projects executed. That will be all for me. I'm going to turn it over to Elena Alschuler who is with the Building Technologies Program at DOE and is responsible for several projects that really

are leveraging data to make it easier to manage these types of programs and analyze their effects. Over to you, Elena.

Elena Alschuler:

Thanks so much, Barry, and thanks for that great intro. Your presentation really sort of highlighted and sort of hinted out where a lot of these common tools will come in, so it really helps to ground all the abstract stuff I'm about to talk about about data here. So, I'm going to do a quick overview of our vision for an ecosystem of tools and data formats, and then I'm going to focus in on three of our projects: a standard energy efficiency data platform, which is like an open-source Access or Excel database for this kind of information; the buildings performance database, which is a central data repository where we can all contribute our data in and analyze it; and then, finally, the common data format, which is called the Building Energy Data Exchange Specification, or BEDES.

So, our vision here is to really facilitate performance-based approaches in the market, and we think that that will help decision makers, like owners, operators, and product and service providers really understand what is driving better or worse building performance and be able to identify opportunities and understand the likely savings really with lower up-front costs and higher confidence. Also, we found that public sector actors are very interested in being able to tailor their programs to the local market conditions and the greatest opportunities in the local building stock. So, in order to do that, we're really trying to promote some tools and methods that everyone can use to do this kind of analysis, as well as standard definitions and data formats to help make both public and private tools interoperable.

So, as you all know, a lot of data about building performance is increasing greatly and it's coming from a lot of different sources. Many people know basic building information about their building, like age, size, location, et cetera. You may also have energy consumption data from a utility or green button. Many cities are doing audits, commissioning and retro-commissioning, as Barry was just talking about in San Francisco. If you've used Portfolio Manager, you've probably also collected operating characteristics, maybe there's tax assessor databases; it's coming from lots of different places. So, a lot of that information gets entered into Portfolio Manager which really sort of gives you a high-level sense of how your building compares to the national building stock, and it normalizes for occupancy, _____ you can get a sense of whether you're good or bad but it doesn't really tell you why.

So, we're developing some building rating tools that get into the equipment and the asset information in the building, and that's the home energy score and the commercial building energy asset score. So, if you're interested in those, please feel free to shoot me an e-mail or Amy and we can send you some more information on that, and that's really collecting some information about the kinds of windows and HVAC systems and lighting and things like that, and running a model of the building to tell you what areas are more or less efficient. There are also a lot of other tools and _____ databases that we recognize people are using that exist out there in the market. There's a lot of building management systems, energy efficiency program databases, property tax assessor databases, et cetera, that are collecting this information.

So, we're working on an open-source platform to help aggregate that data together, so when you're implementing, benchmarking, and retro-commissioning policies, you may have building owners reporting data to you through Portfolio Manager and you're getting an export from Portfolio Manager, and you want to combine that with other data that you may have about your city, such as the property tax assessor database or a city planning database, and then in the cities that have audit or commissioning policies, you're having separate reports turned in for those. So, you want to be able to merge multiple points of information about the same set of buildings together and be able to clean it and analyze it, and that's what we're trying to do with the SEED platform.

Then, we're also building the Buildings Performance Database, which is one central, publicly-accessible database that's available online today, and we envision that a lot of cities with benchmarking and reporting laws, as well as state and local government and the federal government that are benchmarking our own buildings, data from research like the _____ surveys, energy efficiency program administrators, national building owners and others can all anonymously contribute their data into the Buildings Performance Database, and so now it's the largest publicly-accessible, anonymous dataset. You can go in there and slice and dice the data and start to really understand trends and drivers in building performance, and then all of those blue lines I showed throughout the presentation represent using a data exchange specification.

So, the vision here is that if we have some common terms and definitions and some rules for how to exchange and validate data

that it will be easier to combine and share data among public and private tools and across all these platforms. So, ultimately, our vision is an ecosystem of interoperable public and private data tools, and we do have that in the light blue, showing other tools and databases. We do want to recognize that this is just the foundation and that there's a lot of private-sector tools out there that will both be contributing data into and drawing data out of all these systems. So, this is sort of a quick, broad brush, and now I'm going to dive in a little more detail into SEED and the BPD, and maybe a moment on the data spec.

So, we're developing the SEED platform to help state and local governments implement performance regulations. Right now, we're primarily working with the cities that have already implemented building performance disclosure laws and are already dealing with data. There's another half a dozen or so that have reporting deadlines coming up that don't have data in hand yet, and we will help them when they're ready to get there, and then we also see the potential to expand in the future to help with, for example, state and local governments that are benchmarking publicly-owned buildings or national building owners that are also trying to manage data about their own buildings. But across all of these use cases, it's really about trying to manage data from multiple sources about one group of buildings.

So, as I said, we're trying to import data from multiple sources, _____, conduct analysis and reporting. It's a blank database structure and everyone gets their own copy. So, in this sense, it's like having a copy of Microsoft Access or Excel – you populate it with your own information, it's your copy that you save on your local computer or you set up your own version in the cloud, but nobody else can see into it, the DOE can't see into it, it's your data. But it uses the standard data format, the BEDES data format so that everyone is sort of storing their data in the same structured way, and that's important because then you can choose who you want to share your data with, and you can choose external parties, whether you just want to publish out reports or you want to let other software tools have read or read-write or read-edit access to the database. You can control who can interact with it. To help facilitate that, we're building the tool as an open-source software, and there will also be an application programming interface, and all of that is to say that other parties will be able to access or add on to or modify the software as they see fit.

So, this is a little bit too much detail probably for this call but

quickly, the Version 1 will help you import data in lots of different formats. It will provide some error flags and things to help you identify omissions or wonky things like text in a number box. It will also help you match up data from different sources, so if you're importing the results of a retro-commissioning reporting and trying to combine it with Portfolio Manager data, the software tool will sort of look across and say, "Gee, this is the same address and the same square footage, so we think it's the same building," and you can sort of confirm, and it will sort of automate some of that matching for you. Then, you'll also be able to do some analysis, export reports, create reports, allow other parties to access the data, et cetera. Oh, and it's coming out in April. Okay, so we're going to switch gears to the Buildings Performance Database. I know I'm going pretty quickly through all of these tools so, again, feel free to enter questions in the chat box or contact me directly.

So, all of this data that people are collecting in their various SEED instances or that they already have in energy efficiency program administration databases, or, as I said, national building owners, the EIA, _____ datasets and others can all be voluntarily contributed into the Buildings Performance Database. The Buildings Performance Database is the largest publicly-accessible database about buildings and their physical and operational characteristics. It's all real data. You can go in and slice and dice it and try to understand some trends in building performance, but you can never see any one individual record. So, our vision here is by sort of crowdsourcing the largest dataset of real buildings in the country, that it will increase market knowledge and help assess opportunities, forecast performance, and, most importantly, quantify performance risk. So, if you get beyond sort of a single point, we think you're going to save 10 percent and actually be able to say, "This equipment replacement is likely to save between 8 and 12 percent," or something like that. As a result, we think there will be more energy efficiency projects undertaken and that will result in more data in a virtuous cycle.

So, again, a few of our design principles. It's all real data; we don't have any model data, anecdotal evidence, or defaults. It enables statistical analysis without revealing information about individual buildings. Lawrence Berkeley National Lab has a very thorough data cleansing and validation process, and we translate it into the BEDES data format, and then, again, we're going to have this application programming interface, so if you imagine you have an energy management system in your building, they might

actually be able to automatically connect to the Buildings Performance Database and tell you how your building compares to similar buildings. So, right now we have about more than 70,000 buildings, and we're adding more data regularly. We're actually in the middle of processing a dataset of several hundred-thousand buildings for the San Diego Gas and Electric territory, so keep an eye out for that. It's going to be really exciting when that goes live.

Right now, we have data from the EIA, the _____ datasets, we have data on federally-owned buildings, we have all of the engineer-verified data from Portfolio Manager from the EPA, and then we have a bunch of the cities that have benchmarking and performance disclosure programs, several of whom are on this call, so thank you for being such great supporters. You'll see New York City and San Francisco up there, as well as D.C. and some of the others, and then for the private sector, we've had really good contributions from some leading private-sector building owners, and we're also working to get the Better Buildings Challenge partner data in. It's growing every day, so come and keep checking back and let us know if you have ideas for data contributions.

_____ some quick screenshots. So, this is the landing page. We're looking at residential, single-family homes in California. _____ the nice performance EUI distribution there at the bottom. Here's a view of data on office buildings over a million square feet that were built since 1900 in Washington, D.C. This is probably mostly a result of the Washington, D.C. benchmarking data, but there's probably some other data contributors in there. So, you can't see where a particular data point comes from but, if you hover over those points it will tell you the EUI of each of those points, and you can start to see there's actually not that much of a relationship between gross floor area and energy use in the D.C. office buildings. Maybe a little bit of a downward trend.

So, this is our retrofit analysis tool, and, in a few areas of the country, we have enough granular information where we know some things about the equipment in the building that you can start to compare how buildings perform based on different kinds of equipment. So, on the top you see a distribution of all of California big-box retail stores that are over 50,000 square feet, and there's 320 data points for that, so you're looking at a source consumption and it's a count of buildings by EUI. Then, at the bottom, we've taken that group of 320 and we've taken those

buildings that have package-direct expansion and comparing to those that have air-source heat pumps, and it's a 1:1 comparison between all of the buildings in the first group to all of the buildings in the second group. By doing that, you can get a sense of the likelihood of savings _____ the difference between those populations.

So, what you see is that you have about a 58 percent chance of achieving at least 10 percent savings by changing that piece of equipment. That's actually not _____ is not controlling for other factors in the buildings that might be related but, as our data in the BPD gets better and better, you'll be able to sort of say, "Okay, I want to control for lighting and things like that," and then your confidence probability will get even higher. This is also showing heating retrofit California office buildings, and we're comparing hot water boilers to air-source heat pumps, and you see a 68 percent chance of achieving at least 15 percent savings. You can move that green bubble around to understand the likelihood of getting different levels of savings.

So, finally, I'm just going to spend a couple minutes on the building energy data specification, which is our common data format that underlies all of these tools. So, our vision here, as I've talked about throughout the presentation, is to have a robust ecosystem of public and private tools _____ increase information, lower transaction costs, and help the market grow. So, we started developing a common format for empirical data about building energy performance. The current version of BEDES is based on about 40 common data formats. We looked at Portfolio Manager, Home Performance XML, Green Button, the whole range, and we sort of took our best crack at the middle ground of the best terms and definitions.

So, it covers equipment and operational characteristics, energy consumption, energy conservation measures, it covers residential and commercial and multi-family, and, in the future, we could expand to cover modeling data, loan structure data, renewables, things like that. But, for now, we're really just focused on describing the building and how it performs. For each of those fields, we have the data fields, the definitions, the file formats, and things like that, so we'll actually say, "Hours occupied is defined as X, or percent occupied is defined in a certain way, and it's always a percentage that's a number between zero and one," et cetera.

So, we originally developed BEDES for use within the DOE. Our goal was to make our own tools interoperable and to make it easier for grantees and contractors to report data to us, as well as to make it possible for us to internally combine our datasets and conduct further analysis so that we can take the most advantage of the data that our funding is generating. So, just for some examples, we're using it in the Buildings Performance Database, which you saw in this presentation, and the commercial building energy asset score and home energy score, which I referenced earlier. We're also going to be using it as the data collection format for the Better Buildings program, the state energy program, as well as our federal building benchmarking and energy performance contracting activities.

So, as we started rolling this out, within DOE we started hearing from external stakeholders that they needed a common data format, too. We heard from folks that they spend four or five times as much time on data cleaning and formatting than they did on analysis, and so we conducted a pretty intensive stakeholder analysis, and we heard from sort of three major buckets of people, energy efficiency programs and state and local governments, sort of the public actors that are driving data collection, as well as building owners and managers who are trying to make decisions about their buildings, as well as the software developers and contractors who are trying to provide services to those end users and are ultimately the ones who are often collecting and analyzing this data. We heard from all of them that having a common data format would make it easier for them to complete their tasks, combine data, assess opportunities, et cetera.

So, the other thing that we heard in the scoping study was that folks felt it was an appropriate role for the DOE to convene folks to work on our data format and provide comments on it, and develop into something that could be more broadly used by the industry, and folks really felt that that was an appropriate role for DOE to sort of be the convener here, and _____ we're committed to using it for ourselves, this data format would be something that would be voluntarily available to the market. So, to that end, we are convening two working groups. We'll be kicking off this project with a summit on December 11 and 12 if you're interested in participating, and then there will be a technical working group that's going to meet about once a month to really go line by line through the spec and talk about what needs to be in there and the best sort of format, the definitions for the data field, and then there will be a strategic working group which is going to

meet every other month, so it's going to meet about four times, and they'll be talking more about market promotion, roll-out, how do you update this thing over time, what does it mean to be able to translate into or translate to BEDES as opposed to directly adopting it, and things like that. So, if you're interested in participating in that group, there's some contact information at the bottom.

[Side Conversation]

So, this is just the contact information. That's it. So, I'm going to hand it off now to New York City, and I've lost my information. Sorry about that. So, we're going to hand off now to Holly who is the Director of Sustainability Enforcement for New York State City Department of Buildings, and she is implementing the Local Law 87 program there, which is their energy audit and retro-commissioning law, which is part of their Greener, Greater Buildings Plan, which is really the first of its kind around the nation to educate building owners and cut energy consumption through things like benchmarking, audit, and retro-commissioning.

Holly Savoia:

Okay, so good afternoon. Since we have a short amount of time, we took a leap of faith assuming that most people have some amount of familiarity with our program, and so we thought it would be more useful to delve right into some of our challenges that we've been facing as we've begun implementing our program in the New York City. So, first, we thought we'd just share with you the link to our website, which is a repository for us of all things Local Law 87 and we hope a useful resource for those looking to comply.

So, some of the issues that we've faced along the way involve market concerns that have surfaced from the market, and the first concerns the reporting tools. So, we've heard from providers that there is a concern over those offering these services at ultra-low prices because they don't intend to do a whole lot more than fill out the forms. We are forewarned about this possibility, but those buildings when audited will find themselves in a predicament. It's our feeling that eventually we feel that this would shake itself out and that the market will self-correct. So, word will get out about these firms and those firms will not be around long, and we assume that they will fall into line if they need to. The second concern is for non-licensed, credentialed individuals, which we're referring to as registered agents. So, the law allows for those that are not PEs or RAs to submit the energy efficiency reports if they have the

requisite certifications as outlined in our rule, so this has created an attractive market for newcomers to the industry, and the concern centers again on quality of the product that's being delivered and those delivering it, so this is another thing that we're hearing from the market. I think it is worth mentioning that we do encourage those licensed design professionals to also possess the requisite certifications.

So, the second set of concerns surface from building owners, and the first involves the triple _____ lease scenario. For those of you not familiar with what this is, as I was not, these are buildings where the building owner only has responsibility for the building envelope and, in some cases, the exterior lighting. A classic example of this would be a strip mall, where each store tenant bears the responsibility for the base building systems that exclusively serve their space. So, in our case, what we chose to do is to require the building owner to perform the energy audit and retro-commissioning on just the building envelope and on the external lighting, if required. So, it is a limited scope but, in this way, we have an independent third-party registered design professional that's certifying that this is the case. The second issue that surfaced is vacant tenant spaces. So, normally, only those base building systems that are owned and/or fully maintained by the tenant may be omitted from the scope of the audit and retro-commissioning.

So, what happens when you have vacant tenant spaces? Well, what we chose to do is not to require the owner to take the responsibility for adding this to the scope. Other municipalities may choose a different task but this is what we've gone forward with. So, the third concern for building owners was also properties in transfer between parties, so who's responsible for the energy audit and retro-commissioning and complying with Local Law 87 when there's a sale of a building? So, what we've allowed them to do is we've allowed them to apply for an extension, and, in the subsequent year, they can determine whether the seller or the buyer will fill out the energy efficiency reports.

Okay, so for some of the technical concerns that have emerged, we've learned some things along the way, specifically the lack of a balancing standard for steam systems has presented a great challenge for us, specifically with regard with what defines the system as balanced, with most subject matter experts agreeing that this is nearly impossible. So, what we do agree upon is that you can make it better but not necessarily balanced to an agreed-upon

definition of what that means. In addition, for exhaust systems, in some buildings in New York City there isn't even exhaust ductwork that's present, and so the stack effects, as well, make balancing an extremely precise effort. Additionally, we have some square footage discrepancies that have appeared, so what to do with building owners who are concerned that they don't fall under the law? Well, in New York City, the Department of Finance issues the list of who falls under the covered buildings, and many times what we've found is it's an understanding of how to calculate the gross square footage and what needs to be included.

Implementation concerns. One of the things are multiple EERs for the same block and lot, and we're convinced that there's probably a fair amount of confusion as to how many EERs an owner will need to submit. I think we will find this out as the reports start coming in, but the second issue with this the ramification that it's had with our fees, specifically with extension requests and what to charge, because we don't know from our list or our database exactly how the buildings are configured with their base building systems. So, we may know how many buildings are on the block and lot, but we don't know how they are interlinked.

Secondly, there's the deficiency correction in the system components planned for near-term replacement, so how do we handle that? So, the classic example might be pneumatic controls that need to be retro-commissioned, but in the upcoming months they may be planned for replacement with digital controls, so what would you do in this situation? What we have decided to do is to have an affidavit by the owner providing proof of documentation of the project in a capital plan with dates for completion, at which time we would perform a full audit of the project. Lastly for implementation concerns, we have the use of pre-existing studies. In some cases, the reports may not contain all the components that are referred to, and what we've decided is to have them complete the missing parts rather than complete an entirely new audit.

Okay, so just some food for thought for future programs. One is to begin with implementation in mind, how are you going to tactically approach these concerns, and the second is to place great importance on outreach efforts. People approach the law from many different perspectives and level of knowledge and understanding. With that, I would like to turn it over to Chris Plum. Chris is the Program Manager for Commercial and Industrial Energy Efficiency Programs at the Center for Energy and Environment in Minneapolis. The Center for Energy and

Environment is a Minnesota non-profit that conducts research and develops programs that promote energy efficiency to strengthen the economy while improving the environment. Chris is the manager of PBEEEP, a state of Minnesota program started in 2009 that offers retro-commissioning services to all state-owned facilities.

Chris Plum:

Thank you very much, Holly. So, the goals of the program that we did in Minnesota, which are very much in the guise of being one of the beta tests that the earlier speakers have described starting to happen in this industry, was to support a state goal of a 1.5 percent annual reduction in energy use in buildings. In addition, it was to standardize how existing building commissioning is done, because as earlier speakers have alluded to, in a growing and developing industry, there's not a single definition of what this term means, and this causes confusion on the buyer's side of the marketplace because it's hard to evaluate two proposals that have the same title with them.

The definition that we used in the program for re-commissioning I put up here. It's really consistent with everything Barry talked about in terms of what's in the SEE Action guidelines, but the most important thing you'll see is that energy doesn't really show up in the definition. It's really about solving problems in existing buildings and improving building performance and occupant comfort. So, the centerpiece of the re-commissioning study is what we called an energy investigation, and there are many utility-sponsored programs around the country that use this basic model. The investigation which is on the ASHRAE scale of audits that was discussed earlier is like a Level 3 ASHRAE audit, which is a financial grade detailed audit. Typically in these studies, on a moderate-to-large size building, which I'll say is a couple hundred-thousand square feet, we might gather a few million data points about the building, and the reason for that is we're literally looking for individual systems that are not energy efficient even though the overall building itself may seem to be performing reasonably well.

A key component of the process was quality assurance reviews. This helps standardize the output of the product from various different engineering firms that participated in this program. Finally, our determination for how a project would be paid back was based only on its energy savings and not on other lifecycle costs, and that was just statutorily defined. Each area will use its own rules. I'll make one other comment here. Our payback was three years or less, and we'll note that Barry talked about one year

or less. There are two key reasons for that being different. One is that energy costs about half as much in Minnesota as it does in San Francisco, so it takes twice as long to pay back the same project with the same energy savings. The other is that we did look into as many non-operational things as we could that had relatively quick paybacks in an effort to address some infrastructure issues in the course of the program.

So, one of the key things that we found in our program that we would recommend others who are looking at developing, re-commissioning, or audit/re-commissioning approaches would consider is what we call the screening process. Minnesota had about 40 million square feet of state government-owned buildings, so that's about the same size building stock as the city of San Francisco has, for example, and all of those buildings were screened for participation in the program. What that means is that a relatively small number of us at CEE as program administrators went into every one of these buildings and did a sort of Level 1 audit type assessment of the buildings, and we ruled out buildings that did not appear to have good potential for savings that were going to pay back on a cost benefit basis. In that way, we reduced the pool of buildings that would have intensive investigation. This is consistent with things that we're starting to see in, say, reports from some of the remote building audit tools that Barry talked about earlier where it says 75 percent of the savings is in 25 percent of the buildings.

The purpose of this slide is really just to say the criteria are going to vary depending on where you are, and so we have started with a program design that came of the southern California area, where programs like this are very common and well developed. It turned out that if we used their criteria for selecting sites, we would have had less than ten sites in the state that qualified. That's because the climate in Minnesota and southern California is pretty different. So, in our climate, attributes like pump and motor sizes and heating needs were important, whereas in the southern California climate, attributes much more related to the cooling season are important. So, I just bring that up to say I wouldn't use our criteria; I would say wherever you are in the country, you're going to need to develop appropriate criteria for your climate and building stock.

[Side Conversation]

This map just shows you where around the state of Minnesota our

projects were, just to give you the sense that it's widely geographically distributed. So, this is kind of the meat of the presentation, if you will. The types of buildings we looked at varied. We're heavily weighted towards educational institutions and higher educational in terms of state, university and community colleges, but also prisons, some office buildings, and some miscellaneous other building types, such as museums. The savings range is, as you see, all over the map. There's two reasons for that. One is that many of the low-savings buildings are buildings that retrospectively we would have eliminated as we updated our screening criteria but, when we started, we didn't have those criteria. But the more important fact I think is the fact that the median savings that we found was a little over 7 percent, and this is for the total building area even though we didn't necessarily study the total building area.

This gives you a sense of the kinds of things that we found wrong in buildings, and the column that says "affected area" what that means is, for example in the first one, that _____ was excessive, meaning that the building was scheduled to have its systems operate for more hours than there were people in it was found in two-thirds of the space that we looked at. The site energy savings, we use site energy in Minnesota, our average building has a total energy use of about 100 kBtu per square foot, so you can say that those energy savings numbers are approximately percentage energy savings. So, for that particular most common issue, we saw about a 3 percent savings per measure. The 411 percent number at the bottom indicates that we found on average four things in each building.

This just gives you an idea of the overall costs that we saw in our program. Our average site was about 400,000 square feet. We have many, many multi-building locations with the central heating and cooling plant, so there would be an average of eight to ten buildings on one of these sites. You can see by the cost distribution that if we can eliminate a building at screening for a little over \$5,000.00 and not spend another \$180,000.00 on it, that's a cost-effective means of directing our use of funds. Another point which I think has been addressed by the other speakers and certainly ties in well with Elena's slides from the Buildings Performance Database, where you see the broad distribution of energy use by different building types is that a simple application of a building benchmark probably doesn't make a good criteria for choosing which site is one to select for existing in a program and which one not to. We found statistically

absolutely no correlation for buildings that were performing at half of the building code up to one and a half times the building code in terms of the amount of savings we found. The lesson here is don't throw out a building because you say, "Gee, it does better than average." Unless it's doing more than twice as good as average, you can still find savings and often very good savings in those buildings.

Overall, the savings in the program was an average 7.3 percent. It went as high as 27 percent in some facilities. In the three years since we started this program, there's also been a behavioral effect, if you will. The entire pool of buildings that we looked at, which is about 30 million square feet in the state, are now using a little more than 15 percent less energy than they were in 2009. Some of the reason for that is because we've had slightly warmer winters, but about half the reason is because energy use has decreased even though not all the measures that were identified have yet been implemented. Engagement with the facility was very important. That's what really drove this behavioral impact. Facility people saw somebody was there, they were paying attention to energy, and they started to pay attention to energy, too.

This is just where you can learn more about this particular program. I'd like to now pass it back for questions, and they will be administered by Andrew Schulte of ICF for the SEE Action Existing Commercial Buildings working group. Thanks very much.

Andrew Schulte:

Well, thanks, Chris. I know we are sort of over the hour and understand that a lot of you may need to jump off to your next appointments, but there were a lot of great questions that came through. We're obviously not going to be able to answer them all but do want to let you know that we will be passing along the questions that come in to each of the respective presenters to get you some answers to the questions that you've sent us. Just trying to see if maybe we have a few minutes to engage our presenters on a few extra questions. One question that I did want to pose to all and I think may be relevant for the group here is, and this would really be to Barry and Chris and Holly, to what extent did your local utility get involved in the implementation of these policies, and what, if any, role will they play in the collection and use of data collected as a result of these policies? Anybody on our panel who wants to jump at that?

Barry Hooper: This is Barry. I could start off. In San Francisco, PG&E is the investor in utility that serves both gas and electric markets, and they were an active participant in the taskforce recommending the policy. They were one of the first utilities to do the “automated benchmarking service” to provide a web-based upload of the data for benchmarking purposes. It is, however, a challenge. The whole-building approach of the policy has been a challenge to map to utility efficiency programs which tend to have generally a little bit more of a measure focus, and to be focused more on individual decision makers, which often relate to subsets of buildings, common systems or individual tenants, but we have regular coordination _____ sorts of things. The one thing that has not worked has been the utility does invest in various types of evaluations to develop energy efficiency projects, and they just don’t have the resources to invest in audits, the scale the policy is asking for, and so that’s led to reframing the efficiency evaluations that they can subsidize, most of them at least, as evaluations and to differentiate them from the audits that are required by the ordinance.

Andrew Schulte: Great, and I don’t know, Chris or Holly, if you’re able –

Chris Plum: _____.

Andrew Schulte: – okay, go ahead.

Chris Plum: Sure. So, in Minnesota, we actually worked with about 30 different utilities because we were statewide. Two of them had programs in place where there were rebates for studies as well as implementation, but two really important things that I didn’t mention were, first of all, that our program was subsidized by ARRA funds, and, as a result, all the studies were nominally free to the qualifying properties. It was a way that the state was spending ARRA funds at that point in time, so that kind of took away a huge barrier. The second one is that in about 2005, Minnesota implemented a benchmarking requirement for all state buildings, or all government-owned buildings within the state, and, as a result of that, we started out our program with a database that had about 5,000 buildings in it with one to five years of utility data already present and a certain number of people who were already trained in the process of updating their data all the time. So, those were two huge hurdles that we didn’t have to deal with.

Andrew Schulte: Great. Thank you for that, Chris.

Policy Webinar

Amy Jiron, Barry Hooper, Elena Alschuler, Holly Savoia
Chris Plum, Andrew Schulte

Holly Savoia: In New York, we have Con Ed incentives for Local Law 87 audits, as well as NYSERDA incentives, and, through a grant from NYSERDA, we were able to create our reporting tool template.

Amy Jiron: Great. Thank you all so much, and I think it's about time to wrap up. I apologize for being so late but I think that it's been valuable for everyone. One last time, we will be posting the webinar recording, as well as slides on the SEE Action website, so I encourage you to visit that. It will take a few weeks. Again, thank you so much to all of our dream team speakers, and hopefully we'll have some follow-up with them so that you can hear more about how these programs are running, and perhaps we'll have new programs joining into the mix. Thanks, everyone, and have a great day. We'll talk again soon.

[End of Audio]