

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

10/19/17

- >>**Kudret Utebay:** Thank you very much, Grace. Hello everyone, my name is Kudret Utebay with Cadmus Group. I work in support of EPA's ENERGY STAR program. I am happy to be hosting this webinar today, we have four great speakers. Without further ado, I would like to pass the microphone to Julia.

<Slide 1> *Title of the slide is "Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades." **Pictured:** outside of a multifamily building; health, safety, and energy efficiency checklist; and a happy family indoors. "Provided by the U.S. EPA in collaboration with U.S. HUD. October 2017"*

<Slide 2> **Pictured:** *Julia Brooke Hustwit- Multifamily Sector Lead, Better Buildings Challenge, U.S. HUD; Thomas Bowles- Residential IAQ Expert, EPA Indoor Environments Division; William Weber- Senior Research Fellow, Center for Sustainable Building Research, University of Minnesota; Rosemary Olsen-Executive Director, Village of Hempstead Housing Authority, NY.*

>>**Julia Hustwit:** Thanks Kudret. My name is Julia Hustwit, and I'm the multifamily sector lead for the Better Buildings challenge at HUD headquarters in Washington DC. We have a great turnout today, thanks to all of you for taking the time to join us on the phone. I see 135 attendees already and we have over 500 registered, so hopefully we'll be seeing more folks join us in the next few minutes. If you could go to the next slide, Kudret.

<Slide 3>

On today's agenda we'll discuss why it's important to integrate indoor environmental quality measures into new construction, retrofits, and operations and maintenance work, we'll talk about how to use the Environmental Protection Agency's Energy Savings Plus Health Guide for Multifamily Housing Upgrades, we'll discuss what the benefits are to an integrated approach to building performance.

We're going to hear from two multifamily housing providers who have had recent successes in integrating energy and health in their retrofit work, and at the end of the session we'll take questions and answers from the audience. Next slide please.

<Slide 4>

At the end of this webinar, we hope that you'll feel confident in implementing the guidance laid out by the EPA, and in integrating a health focus into your energy efficiency projects. We hope you'll be able to create a custom checklist using the Multifamily Checklist Generator, and apply best practices as described in the case studies that we'll be hearing today. Next slide.

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

***Pictured:** Better Buildings Challenge: U.S. Department of Energy & U.S. Department of Housing & Urban Development logo.*

Many but not all of you on the phone today are part of the Better Buildings Challenge and we are bringing this webinar to all of you through our work in the Better Buildings challenge, so before we get started, I'm going to take a quick moment to provide some background on that program. Next slide.

***Pictured:** Pyramid with Utility Benchmarking at the top, Energy & Water Efficiency, Renewable Energy Retrofits + O&M in the center, and Indoor Health, Disaster Preparedness, and Job Training on the bottom.*

The Better Buildings Challenge (BBC) is a Department of Energy led initiative that asks real estate owners to pledge 20% reduction in their energy consumption, across their portfolio, over the course of ten years. The Department of Housing and Urban Development partners with DOE and leads up the multifamily building sector of the program. We are a hundred and fifteen partners strong and home to about 750,000 housing units across six hundred million square feet of real estate as of today. In the BBC, we spend most of our time promoting energy efficiency through utility benchmarking, retrofits, and operations and maintenance. However, we recognize that buildings are systems of interrelated parts. At any moment of intervention into a building, care should be taken to ensure that improvements to one aspect don't negatively impact another. Moreover, opportunities to create multiple benefits to building performance should be taken whenever possible. For this reason, we encourage the use of holistic green building approaches as much as possible, and this year in the BBC, we're taking a special look at the intersection of energy efficiency with indoor health, disaster preparedness, and job creation. Next slide please.

You'll be able to find more information about these and other topics on our website: [HUD exchange dot info slash programs slash Better Buildings challenge with dashes](http://HUDexchange.gov/info/programs/Better-Buildings-Challenge). And at this point I'd like to thank the EPA for partnering with us to provide their expertise on these subjects, as well as two of our distinguished Better Buildings challenge partners, the Mankato Economic Development Authority in Minnesota, and the village of Hempstead Housing Authority in New York, for contributing their first-hand accounts. We'll hear first from Thomas Bowles of EPA's Indoor Environments Division, then William Weber, a senior research fellow at the University of Minnesota, and last we'll hear from Rosemary Olson, the Executive Director of the Village of Hempstead Housing Authority. With that, I'll hand over the microphone to Thomas.

>>Thomas Bowles: All right thank you. As mentioned, this is Thomas Bowles, also known as Tommy Bowles. I am the program manager for our protocols that we have for existing building upgrades, so without further ado.

***Pictured:** Energy Savings Plus Health: Indoor Air Quality Guidelines for Multifamily Building Upgrades cover; Healthy Indoor Environment Protocols for Energy Upgrades*

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

cover; and Energy Savings Plus Health: Indoor Air Quality Guidelines for School Building Upgrades cover

Whether you live in an apartment, town home, single-family home, an old home, or are building a new home, there are many ways to protect and improve your indoor air quality. The Indoor Environments Division at EPA has multiple programs that will help you take immediate steps to protect indoor air quality in your home, and prevent indoor air quality problems during remodels, renovations, or even building something new. We have specific guidance for schools, single-family existing homes, new construction specifications for those single-family homes, and of course, the topic for today's discussion, multifamily building upgrades. Go back a slide please. Can we go back a slide? There we go.

So here's a look at what was just mentioned on the previous slide. This is the guidance we have for all existing buildings. Millions of American homes every year are upgraded or remodeled to improve their energy efficiency, to make them more comfortable, affordable, or add features. The benefits of home upgrades are tremendous: improving quality of life for occupants, protecting the environment, and sustaining American jobs. The important message that we would like you to take away today is that integrating healthy home and energy-efficiency upgrade activities simultaneously, you can lower utility costs, and improve indoor air quality at the same time. Leading energy efficiency upgrade programs have demonstrated the feasibility of integrating many indoor air quality and safety improvements. However, home energy upgrade activities might negatively affect indoor air quality if the appropriate home assessment is not made before work begins, or if work is performed improperly. Next slide.

Pictured: *Workforce Guidelines for Home Energy Upgrades cover*

So here's a look at the DOE Guidelines that work in concert with our protocols. The Department of Energy developed the guidelines for home energy professionals which contains standard work specifications and reference technical standards for a wide range of energy efficiency upgrade measures. These standard work specifications define the minimum requirements for high-quality energy efficiency upgrade work and the proper conditions necessary to achieve the desired outcomes of a given installation or upgrade measure. So DOE and the EPA have collaborated closely throughout the production of these documents which are complementary and mutually supportive. Next slide.

Pictured: *A contractor weatherizing pipes*

So what exactly are the protocols, what is their purpose? The EPA protocols, along with the DOE Guidelines, are intended for voluntary adoption. This is through private sector home performance contractors, HVAC contractors, remodeling and renovation contractors, weatherization assistance programs, and federally funded housing programs just to name a few. Together, the complementary documents provide a robust and practical set of resources. This will help improve the quality of work performed in the remodeling and home performance industry, assist trainers

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

and program administrators in establishing standard protocols, promote occupant health and safety, and ensure consumers that high- quality work is performed. Next slide.

Pictured: *A multifamily building with a playground in the courtyard*

So, what is multi-family? I'm sure most of you on the webinar already know, but this particular guide applies to multi-family residential buildings containing at least five residential dwelling units that share one or more building systems. Each multi-family dwelling unit typically shares at least a floor or a ceiling, and one or more walls with other dwelling units. Multifamily residential buildings can range from low rise to high-rise buildings. Low-rise multifamily is a structure of up to one to three stories, mid rise, four or five, and high-rise, anything over six. Next slide.

All right. So why do we even need guidance for multifamily building upgrades? Well, 80 million people live in multifamily buildings, and many of these buildings will be retrofitted in the coming years to renovate their existing structure, improve energy efficiency, improve long-term durability, and ensure good IAQ. Some of these upgrade activities, however, might negatively affect IAQ if the appropriate building assessment is not made before work begins, and issues that can compromise IAQ are not identified and properly addressed. Also you do not want a project to mask a problem, it can show its ugly face later down the road, and possibly even cause more problems than you started with. The important thing is that the guidance can ensure that all of your energy efficiency upgrades are done properly the first time, so you save money and ensure healthy indoor environments are maintained throughout its lifetime. As mentioned before, these guidelines are here to help you with anyone and everyone who is involved in the renovation or remodeling effort, to integrate important health protections into their projects. Next slide.

Pictured: *A young boy using an inhaler*

So I think you're all aware of this, but as a reminder, the reason we are talking about how to protect indoor air quality during energy upgrades is because we want to protect staff and occupant health, we want to improve cognitive function of occupants, increase comfort and dwellings, enhance the physical environment, and by proactively managing your indoor air quality, you will achieve all of these things, and all of these benefits will save you money. Next slide.

Pictured: *A group of smiling people sitting on an outdoor porch*

So, enhanced energy efficiency upgrades have been shown to reduce indoor air contaminants linked to chronic illnesses, control environmental contaminants that can trigger respiratory symptoms, and improve symptoms of asthma and other respiratory health conditions. The studies also found reductions in other indoor air pollutants, and reported improvements in blood pressure and fatigue. One small study of low-income clients also showed a reduction in healthcare costs among U.S.

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

residents. The enhanced practices must closely match common practices in the home performance industry. Next.

Pictured: *Energy Savings Plus Health: Indoor Air Quality Guidelines for Multifamily Building Upgrades cover*

So, the specific guidelines. These specific guidelines were released in January of 2016. They were designed so that if you are involved in any aspect of multifamily building repair or renovations, including energy or other retrofits or upgrades, these voluntary guidelines will help you ensure that occupant and worker health and safety are protected during and after completion of building modifications. The Guidelines will be helpful to federal, state, tribal, and local weatherization assistance programs, federally funded housing programs, industry standards organizations, private sector Home Performance organizations, and other contracting organizations. So this guidance document and accompanying customized Checklist Generator which we will get to later can help be a guide to preparing and renovating your home in a way that protects and improves indoor air quality, but also maximizes energy efficiency while minimizing your costs. Next slide.

Pictured: *Health, Safety, and Energy Efficiency checklist with all three boxes checked*

So the whole point of this document is to incorporate health and safety into consideration when performing the already proven benefits of energy upgrades. So if you happen to have any indoor air quality energy or sustainability plans already in place in your building, this guide will only complement those things, it will never override them. Next slide.

So given the unique complexities of multi-family residential buildings, this guide differs from EPA's protocols for single-family homes. For example, these issues here that you see can be significantly different or unique to multi-family residential buildings. This is due to the wide variety in multi-family residential building designs and the magnitude and scopes of building upgrade projects, so this guideline can vary quite a bit when it comes to how you use it. For example a small project focused on only window upgrades would refer to a very small subset of this guide, while a larger more extensive renovation could refer to most of the priority issues that we've laid out. There are 24 priority issues that are covered in this guide altogether. Next slide.

Alright so how do they work? So as mentioned, there's 24 priority issues. For each of those 24 priority issues, the multifamily guidelines identify critical minimum actions intended to correct deficiencies identified during the assessments, incorporate minimum IAQ protections, and ensure that work does not cause or worsen indoor air quality or safety problems for occupants or workers, i.e., do no harm. EPA recommends these protections for all building upgrade projects. Also included are a set of expanded actions to promote healthy indoor environments that can be taken during many building upgrade projects. EPA recommends considering these improvements when feasible and sufficient resources exist. The assessment

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

protocols minimum actions and expanded actions are designed to incorporate good indoor air quality practices into a variety of multifamily residential building upgrade projects. To be effective, the recommended assessments and actions should be built into the very earliest stages of project conceptualization and design. Working as a team, building upgrade contractors, building owners, property managers can use these guidelines to better understand the interrelationships between building upgrades including energy efficiency upgrades and IAQ goals They also can use the guidelines to identify opportunities to protect and promote healthy indoor environments during typical building operations, maintenance, and energy management tasks. Next slide.

So this is what a typical page would look like in section 2. So this section 2 is assessment protocols and recommended actions, this is where the meat of the Guidelines is. You can see on the left hand side there is assessment protocols and this is where you'll find out how to properly examine your building for potential upgrade opportunities. In the middle, once you find those opportunities you will move on to the minimum actions where you can assess these... once you've assessed, you can move on to the minimum actions and take care of your issues while also making sure that you are doing your energy upgrade. And then there's also the expanded actions on the right-hand side, which is sort of a step up from at least the bare minimum actions that you should take. Next slide.

Pictured: A bunch of words of different issues such as IAQ Risks, HVAC Systems, Transportation, Construction, etc., and an arrow with "Energy Efficiency"

So issues come up with all sorts of shapes and sizes how do you keep your staff organized during regular maintenance and retrofits, how do you protect indoor air quality indoor environmental quality during these hectic times, Next slide. Best thing for organization by far is our Checklist Generator tool. So this is here to keep you organized. The Energy Savings Plus Health Checklist Generator for Multifamily Building Upgrades is a tool to be used in close conjunction with the EPA Guidance document. This is an Excel spreadsheet. This interactive tool will allow users to create customized checklists for each individual project, verify that assessment protocols for multifamily building upgrades have been appropriately applied, ensure that appropriate minimum actions and expanded actions in the guide have been taken to protect or enhance indoor air quality. Next slide.

Pictured: MS Excel Checklist Generator

Here is an example of the checklist, what you will see when you actually fill it out. So you can see that right now we have clicked lighting upgrades and systems operation and maintenance clicked so once you click those things they will spit out things to consider when doing your assessment, and then once you assess you will find minimum actions that either need to be taken into consideration, or that you can avoid. Next slide.

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

Pictured: MS Excel Checklist Generator example

So this is just more examples. These are actually included in the table right at the beginning. These are all basically the bread and butter of energy upgrades, something that you see a lot. So here you will see lighting upgrades. As an example you move on to the middle, you'll see that we're talking about the health risks that are involved when doing a lighting upgrade and some of those. So move on to the next one.

Another one here for instance, upgrading roof and ceiling insulation. A lot of times you will be using spray foam for your insulation just as an example some things to consider making sure that the proper ratios are used for that, the proper cure time, another thing involved in any type of roof and ceiling assembly repair may be tightening up your building envelope and when that happens tighter means sealing in some contaminants that are inside your building, so sometimes it will call for increased ventilation or if you're in the unlucky case that you have radon some radon mitigation. Next slide.

Again, more examples, concrete floor, again properly sealing mainly is a moisture issue, so properly sealing all floor penetrations that can you know avoid any moisture problems that you may have, mold growth in your building, and then also another thing with radon is that if you have a radon mitigation system in place, it may not work properly if not all the correct sealing has been done. Next slide.

Again more examples, this one I'll just gloss over real quick. This one is talking about outdoor air ventilation, mainly the concerns come in more humid climates so just you have to emphasize additional dehumidification for the humid climates when outdoor air is supplied. So these are just all examples and lastly next slide.

Okay so these are more examples, this one adhesives and sealants are used a lot during tightening up the building envelope, just make sure that the sealants adhesives things that you are using contain low VOCs or no VOCs sealants and adhesives for those projects, so just keeping those things in mind. Next slide.

And this one I'd like to highlight because this one is about operation and maintenance, so this is stuff that you can train your team, train your occupants on. A lot of preventative maintenance stuff can go a long way. Calibrating sensors, checking control systems for improper operation, replacing filters, cleaning supply diffusers, things like that can save money by reducing loads on your HVAC equipment as well as ensuring a longer life time of those systems, so more bang for your buck. Next slide.

Pictured: 3 ducks in a row; duck with sunglasses and a hat.

So the idea here is to have a holistic approach to address indoor air quality, energy efficiency, and sustainability. So the guide along with the accompanying Checklist

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

Generator can help ensure that projects progress smoothly while maintaining occupant health and safety. Energy efficiency and sustainability improvements go hand-in-hand with indoor environmental health considerations. A holistic approach is key to planning and implementing building maintenance projects that improve health and safety and maximize energy and cost savings. To help you organize and get all your ducks in a row, EPA has outlined the most common indoor air quality contaminants associated with various building upgrades, and the actions you can take to protect occupant health and safety, from planning and commissioning to moisture control, mold remediation, and effective communications and worker safety. Next slide.

So if you need any help, feel free to check out our website which is listed right here, or also don't hesitate to send me an email. Again I dive into this quite a bit, so if there's any questions you have about it, or would just like to chat, feel free to shoot me an email.

***Pictured:** Different parts of a multifamily building, including an outdoor courtyard, loading dock/parking lot, room, laundry room, and outdoor vent*

>> **William Weber:** So this is "Billy" Weber, William Weber from the Center for Sustainable Building Research, and I'm going to share our project that we worked with with the Mankato EDA, their renovation of Orness Plaza. The project was intended to increase health and environmental improvement in green building, our multifamily project. And it was also the subject of a health study called the Green Rehabilitation of Elder Apartment Treatments, also known as the GREAT Study. Next slide please.

***Pictured:** Outside of Orness Plaza; courtyard; outdoor eating area*

So the Orness Plaza is a 101 unit, mixed-income apartment, serving primarily elderly and disabled people, and it is a seven story building originally constructed in 1971. It underwent a substantial renovation, the primary goals of which were to extend the useful life of the building, while focusing on healthy living environments for the residents, improving indoor environmental quality, and reducing energy and water consumption. The total development cost as you can see there is about nine point eight million dollars of different various funding sources including the American Recovery Reinvestment Act and HUD capital grants. The project did receive both the LEED New ND Silver rating from the version 2009 and complied with the Green Communities criteria Overlay which is a requirement of our state planning agency. Next slide please.

The project team took an integrative approach from the beginning, starting by assembling the team, which included not just the owner and development partner Southwest Minnesota Housing Partnership, but the architect as well as engineers, to address some critical issues that the building was facing. In addition, the research team included the National Center for Healthy Housing Office as well as ourselves

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

here at the Center, and the research studies sponsor was HUD Office of Lead Hazard Control and Healthy Homes. Next slide please.

Pictured: Residents' doors; outside of building

So as I said, the project took an integrated approach to address some critical failures that were happening in the building, namely there was a failure of primary structure and the facade windows as well as aging mechanical equipment. We started by gathering the team together and outlining a clear vision, driving consensus on the intention of the vision and discussing quite in depth what it meant to create healthy indoor environments for elderly occupants. The identified key issues for the project really were to address the envelope and mechanical systems, and in order to do that, we broke the team out into working groups and identified both qualitative and quantitative factors that would go into decision-making as the project moved forward. During design and construction, these groups continued to work together, addressing not just issues of cost and efficiency, but also the impact of choices on thermal comfort, moisture risk, and durability. Next slide please.

Pictured: Cracks in façade; wall with moisture damage

So the project actually precedes the EPA's guidelines that we're talking about but it did intersect and touch on many of the 24 action areas that the guidance tackled. For us primarily, those were moisture control and mold due to the failure of the facade. Addressing environmental tobacco smells, the building went smoke free as part of the process. New equipment including the introduction of ventilation into the units, prior to that they were not ventilated other than opening a window, and then because the building was occupied during the construction phase, building safety for occupants protecting IAQ during construction and job safety were also tackled. They were paramount to the success of the project. Next slide please.

As I said, the groups really worked to chart both the qualitative as well as quantitative information for the different decision-making processes and to tackle both mechanical and the envelope. I'm showing the mechanical one here simply because even though there's a lot of information, the envelope matrix was even more complex, but the idea was to get the group together and weigh the pros and cons of the different systems essentially by writing everything down. Tackling energy efficiency as well as maintenance life expectancy, and other impacts from the systems that we were deciding between. When we came time to really tackle the envelope, we included things like Building Enclosure Council Design Guidelines, which really helped us weigh considerations of durability, thermal comfort, and mold and moisture prevention. Mold and moisture prevention was a considerable concern as the building had mold abatement prior to the reconstruction or the renovation. Next slide please.

Pictured: Outdoor eating area; courtyard; apartment kitchen; HVAC system

So the project really breaks down into three major areas, although the comfort and moisture and air quality certainly have a lot in common. The renovation included

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

new envelope, stabilizing the primary structure and air sealing, as well as introduction of a new mechanical system. On the air quality side, moving from the moisture and comfort issues the ventilation via a dedicated outdoor air system into each apartment, balanced with bathroom exhaust fans, was a significant improvement. We also used low and no VOC sealant and paint etc. throughout the building, and then as I mentioned before kind of the general safety issues for lead, asbestos abatement, there was asbestos tile that was abated, during the project. Next slide please.

Pictured: Graph of Annual Energy Intensity of Orness Plaza Apartments showing major decrease of EUI; Graph of Water Use showing decrease

A little bit about outcomes and balancing our decisions to tackle indoor environmental quality as well as reduce our energy and water use So we had a significant success on energy reduction- we reduced the overall energy use by 45%. The mechanical system was shifted from a boiler system to a geothermal system, which was projected to save about a quarter of a million dollars over the first 10 years of operation. The consideration for energy penalty by adding ventilation was discussed by the team but was considered obviously something that we were going to do, so it was taken as a given, but still with the added ventilation we were still able to create that energy savings. The project water savings was also reduced significantly by 54 percent. I can send the full slide, it's a little difficult to see, but these are before-and-after measurements of CO2 in the units and there was a significant reduction in the average level of CO2 in the unit. Prior to construction at the top, those are quartile percent bars, and the lower is after and you can see just a relative drop in the measurements of CO2 attributable to the introduction of ventilation into the project. Next slide please.

Pictured: Outdoor eating area; courtyard; apartment kitchen

And finally the Health Study, which was really looking at the impact of the renovation on the residents' health, and the Health Study that that green healthy housing renovations may result in improved mental and physical health, prevent falls, and reduce exposure to tobacco smoke. The most significant difference was an improvement in mental health of the residents pre-construction and then post renovation a year post renovation. The implementation of no smoking in the building also saw a pretty significant reduction people smelling smoke in their units afterwards. The results don't refer to significantly fewer water and dampness issues, as well as a decreased use of pesticides in their unit. ***Pictured:*** Before and after pictures of Orness. With that, I will turn it over to Rosemary Olson from Hempstead Housing. Thank you.

Pictured: Pipes and a switch

>>**Rosemary Olsen:** Hello, my name is Rosemary Olson and I'm the Executive Director of Hempstead Housing Authority which is located in the village of Hempstead in Nassau County, which is right outside of New York City. Next slide.

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

Our retrofit project is Gladys Gardens which is in the village of Hempstead. It's a 30 units family townhouse development. It was built in 1972 as public housing and is currently used as public housing. It has a central heating system and hot water system that's gas fired through baseboard heating, and at the time that we started the project back in 2013, the heating system and hot water system were on their last legs leaking hot water, and our hot water system throughout this was leaking. In addition we had drafty windows, insufficient insulation, leaky roof, the roofs we actually had three layers on the roof failing leaders and gutters, and inefficient incandescent lighting. Next slide please.

Pictured: *An outside door with a grill next to it, as well as a boarded window.*

The Housing Authority itself was designated as troubled and was in severe financial distress due to fraud and mismanagement at the time that I started in August of 2013. There were significant maintenance problems throughout our Authority, and the Mayor's office received many complaints about insufficient heat, especially at Gladys Gardens. This was our worst development. One of our tenants was complaining at public meetings about her home, that it stinks due to the the moisture issues in the crawlspace below, so this is a photograph of the kind of conditions we had at Gladys Gardens when I first started. Advance to the next slide please.

Pictured: *Back of the building with building materials and a ladder to the roof with a man inspecting roof*

So given our financial condition and the problems that we had with Gladys Gardens, and our other buildings we were looking for some solutions, and one of the solutions that presented itself was joining the Better Buildings Multifamily Challenge and starting to benchmark. As part of a challenge we selected Gladys Gardens as our showcase project because we knew that we were planning to do a retrofit. When I started digging in to find out why the building was in the condition that it was in, one of the reasons why our hot water system leaks had not been addressed in the past was fears that the one of the architects that we had, that we had asbestos in our system you know covering pipes. So immediately I went about having it tested for asbestos, given my concerns about our residents and our workers, and we found... and the testing cost less than a thousand dollars and determined that there were no hazards found. Then we proceeded to do some lead paint testing pre-construction to make sure that wasn't an issue, and again we found no hazards. These tie directly into EPA's protocols in terms of planning of pre-construction for healthy indoor air quality. In order to do an energy retrofit, we needed to replace the severely leaking hot water piping throughout, so we used some HUD capital fund project money for that and the cost was a little over a hundred thousand dollars to replace the water hot water system, and we installed pipe insulation at that time. That enabled us to go ahead and apply to our local weatherization provider Community Development Corporation of Long Island for weatherization assistance, and they really did a terrific job and were a great partner overseeing this retrofit project and providing the funding. I have to really thank them for this and for all their efforts. Could you go to the next slide?

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

Pictured: Four team members in front of CDC Long Island banner and Nassau University Medical Center banner

Because the efforts that we had with Community Development Corporation of Long Island started out as simply a weatherization project, and really expanded into a partnership for healthy homes. As it turns out, we had applied for the weatherization project, and at the same time they had received a grant from NeighborWorks America and Chase Foundation, to look at the health impacts of housing, and how health can be improved or impacted by housing, and so they were able to leverage their federal weatherization and LIHEAP funding with these foundation grants to take a more holistic look at health. And then we leveraged our HUD public housing capital fund program, for our owners contributions that a boiler design and for our training expenses for our maintenance. Please go to the next slide.

Pictured: Prestige-branded high efficiency gas condensing boiler

So our retrofit project planning was done primarily with the CDC of Long Island Community Development Corporation of Long Island, they had two BPI multifamily building analysts who conducted an energy audit, and they also had there as part of the Healthy Homes project worked with us on a health and safety assessment and resident survey so we actually did two separate Health and Safety surveys as part of this project. Things that we were looking at included moisture, ventilation, equipment and safety hazards. And then with the residential rehabilitation analysts also looking at pests, smoke, and carbon dioxide detectors. We did replace non functioning smoke and CO alarms ourselves during the inspection process. We went and hired Bright Power which is an energy management firm to design and develop specifications for an energy efficient or gas-fired boiler and hot water system and you could see a picture of it here. That involved adding a different type of installation for HVAC which included venting from the boiler room. A scope was developed on the project and CDC of Long Island put all the projects out to bid. Advance to the next slide.

Pictured: Attic with insulation being measured with a yardstick

So the energy efficient measures that we installed included boiler and pipe, additional piping and venting, we also installed attic insulation and did air sealing in the attics. New windows were installed throughout, which we also made a contribution to, and we used the loose cellulose attic insulation. As you can see these on the slide it shows the different measures how they tie into the EPA checklist. Advance to the next slide.

Pictured: Back of building with construction materials and a work van

As part of the retrofit project we also were able to replace all of our lighting throughout with LED fixtures which is a terrific option for a public housing authority because it's a lot less maintenance, and in terms of, you know, length of, and from an operation and maintenance standpoint along with saving on energy and much brighter. One of the things that they wound up installing as part of the project was bath fans for the ventilation compliance, which our maintenance staff really love because it reduces the amount of moisture in the bathrooms which you know has the effect of... extends the life of our bathrooms, which is really a helper on the

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

maintenance side. A new roof was installed with ridge venting and leaders and gutters, and then our maintenance staff are all trained as BPI multifamily building operator training, so it really enlightened them on good maintenance practices and we've been working on that together ever since. That was paid for out of our Capital Fund program and also with a grant from NYSERDA and New York State Energy Office. Please advance to the next slide.

So some of the indoor air quality improvements and health and safety improvements that were part of our project, the number one thing was moisture control and reducing mold, because of the replacing of the leaking hot water pipe, the roof leaders and gutters, the boiler system and hot water system, you know the new windows... and then with air sealing and insulation. Other improvements were the lighting improvements in terms of pests, the reduction of the moisture that we did through the project helps reduce the amount of pests as we also looked at it as part of our inspection protocol which helped us mitigate some of the pest issues with it throughout the development. We also looked at venting combustion appliances you know and safety we had also had gas stoves, so that was looked at as part of the project and replaced as needed, and the design and replacement of our heating and water system was very significant, along with ventilation and then again safety inspections and CO detector replacement throughout. Advance to the next slide please.

So the overall energy project costs was less than \$400,000, with an energy cost savings of approximately \$20,000 a year, and that doesn't include the savings on our water costs which I have not yet calculated, but this is fairly significant- a 40% energy savings. Please advance to the next slide.

There were also a lot of other benefits to the project. We did pre and post surveys of the residents in terms of their health and the impact of the project, and some of the post- retrofit impacts were... Gladys Gardens really was very very dilapidated development and it's now one of the more desirable places to live in a community, because of this and other improvements that we made to the development. We have received no more heat and hot water complaints and our resident turnover has been reduced, due to the quality of the living space. Also the residents reported increased comfort, that their homes were warmer with fewer drafts, that they were able to sleep better, that it was easier to breathe, that they could identify trip hazards better due to improved lighting, and that the new windows reduced outside noise as well as reducing drafts so that really had a real positive impact on the residents quality of life. Advance to the next slide please.

So this was a terrific project and again, I'd like to thank Community Development Corporation of Long Island, EPA, HUD, and the Department of Energy for their efforts in the Better Buildings program. Thank You.

Tackle Energy Efficiency and Indoor Air Quality Together: Best Practices in Multifamily Housing Upgrades: Webinar Transcript

>>**Kudret Utebay:** Rosemary, thank you so much. Tommy before I pass the microphone back to you I would like to remind our participants that they can submit their questions through the chat box on the upper right corner of their screens. Please keep sending those questions and in a few minutes we will start answering those questions. Tommy, back to you.

>>**Thomas Bowles:** Alright, well thank you Rosemary and Billy, so important to point out that our protocols weren't actually out when they were doing these but like they had presented, a lot of what is in the protocols is actually addressed in their work. So here are some resources that help you in your next project besides obviously the main protocols, so take a look at these if you ever feel like you need to brush up on different things Ventilation stuff from ENERGY STAR, existing multifamily housing, so yeah. Next slide. ***Pictured:*** *Contacts a Q&A with question mark symbol.* I think now we are ready for questions.