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of the

COMMITTEE ON ENVIRONMENTAL PROTECTION

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CHAIRPERSON GENNARO: Okay, so we're being recorded now? It started? Okay, very good. Good afternoon, I'm City Council Member Jim Gennaro, I'm Chair of the Committee on Environmental Protection. We're joined by Council Member Oliver Koppell and today the Committee will hear a new topic, the potential of geothermal energy in New York City. We'll also hear a bill, Intro 694, I'm the prime sponsor of that bill, it's also been co-sponsored by Council Member Koppell and several other members, I'm grateful for that support, which seeks to facilitate the use of geothermal ground source heat in New York City. Heat from within the earth can also be harvested in various ways to create clean renewable energy. The earth's core retains heat from the time of the earth's formation; additional heat is generated by the breakdown of radioactive substances within the earth, the radiated heat from the sun and other sources. The heat moves via convection and conduction outward from the core towards the earth's surface, the result is a virtually unlimited amount of heat that keeps the sub-surface at a steady warm temperature.

Geothermal ground-source heating and cooling uses technology to access the heating and cooling potential of underground heat. The potential use is much broader in scope than the use of geothermal resources found at or near the surface, as relatively-shallow wells can reach depths with sufficient heat to meet these energy needs. In addition, geothermal resources can be used to generate electricity. The essence of ground-source heating and cooling is that it uses geo-exchange technology to exchange heat between the stable temperature of the earth and the inside of a building in order to heat the building in winter and cool the building in the summer. In the case of New York City, the sub-surface areas maintain steady temperatures in the low 50 degrees Fahrenheit. In a geo-exchange system, a fluid such as water is pumped between the building and the below-ground environment. In the winter the heat picked up by the underground fluid is used to heat the building, and in the summer the fluid removes heat from the building and deposits it beneath the ground. The origin of the heat is often called the source when it is … the origin of

the heat is often called the source, and when it is taken it is called the heat sink. Ground source heating and cooling can be effected almost anywhere in the U.S. using a geothermal heat pump, a highly efficient renewable energy technology. Many residential buildings and commercial organizations in New England operate with such ground source heating and cooling systems, including Trinity Church and the Massachusetts Audubon Nature Center in Boston, and the city hall annex in Cambridge. New York City also has residential buildings either using or planning to use geothermal energy, including a 26-story 225-apartment New York City Housing Authority on East 28th Street that is scheduled to convert to geothermal heat and hot water. Traditional systems rely on heating or cooling air, and then transforming it around the building, a much less efficient approach. In addition, where the hot and/or chilled water can be used instead of disposed in the ground, further efficiencies can be achieved. Next, each heat pump works independently to heat or cool the zone or room it serves, making these systems both efficient and

better at servicing buildings that have multiple zones. Last, ventilation can be achieved using additional heat pumps, there is no need for heat recovery systems. All these advantages help make these systems easy and cheap to maintain, and contribute to their long life expectancy. One final critical advantage is that these systems are better for the environment than other similarly-purposed systems. All of the advantages above, less equipment, efficient movement of energy and the like, directly lead to a lower pollution footprint -- we like that. In addition, the small amount of electricity needed to operate the system is located at a power plant and not onsite, where a scrubber and other technology will help reduce pollution. All these traits add up to making geothermal heating and cooling good technology in terms of reducing greenhouse gas emissions, a very big thing for us here in New York City. New York City is moving to embrace its geothermal energy potential, however most New York City buildings could utilize geothermal energy for heating, cooling and hot water production. Today's hearing is the first step towards a more sustainable

future use of energy that does not create greenhouse gases, and that does not damage the environment in the process of retrieving energy. And so that's the oversight topic, with regard to Intro 694, we just have like a brief summary of the bill, this is from the Committee report, which is available for anybody who wants it. The bill would add a new paragraph to the city code which would require the city to undertake a study of geothermal subzones underneath the city to determine which are best suited to geothermal heating, cooling or power production. The study must include, at a minimum -- this is kind of right from the bill -- an accounting of existing geothermal projects, impediments to geothermal energy, and ways to facilitate geothermal energy use. The study is to be released, according to the bill, the study would be released first as a draft and then as a final report, if the study concludes that more geothermal energy use is not expected, it must explain why, and there must be a new analysis of the topic after three years. And the purpose of this is to really get the city to deeply immerse itself in this technology, it's

something that's already going on within the Bloomberg administration, folks from DDC, folks from DEP, are working to explore this technology and they'll be coming forward today and talking about their efforts, as well as their views on Intro 694 should they choose to make a hard recommendation on 694. And we did this recently with another kind of energy technology, on hydro, and we see this, we're coming to a stage in this Council and in this administration where we're seeking to crystallize as many of the good environmental ideas we have into local law so that the next Council and the next administration will have an obligation to follow through on these good initiatives. So it's getting close to wrap-up time for this Council, or those of us who are term-limited, and for the Mayor, who is also term-limited, and we want to leave a lot of good work for those who follow us to follow through. I've been very pleased at the deep commitment to the environment from the Bloomberg administration, the visionary PlaNYC, Speaker Quinn, Council members like Council Member Koppell and many others who have a real deep commitment to the environment.

We would like to see this work continue in the next Council and in the next administration, that's kind of what we're doing here today, and the best way to do that is to reduce it into actual law, and that way it gets done. So with that said, we would like to thank everyone for being here, we want to welcome the Bloomberg administration, there will be one or more representatives from the Bloomberg administration who will give us the benefit of their views, and who would that be? Do you have the slips there?

MS. SWANSTON: Yes, here they are.

CHAIRPERSON GENNARO: Okay, so this is the first panel: Alex Posner from DDC, Sergej, who works at DEP, right? It says City Hall, Mayor's office, but Sergey works for DEP, and you come forward and then you'll give us the benefit of the proper pronunciation of your last name, Sergej, and Alex, I've got to call you by your first name too, you know, it's a first-name thing. Yeah, and so with that said, I would like to ask the counsel of this Committee to swear in the panel and then you can proceed with your good statement. I believe there's just one statement

on behalf of the administration, is that right? Or two statements? Joint statement, okay. Samara, if you please.

MS. SWANSTON: Gentlemen, would you please raise your right hands? Do you swear or affirm to tell the truth, the whole truth and nothing but the truth today?

MR. MAHNOVSKI: Yes.

CHAIRPERSON GENNARO: Okay, thank you, and I would ask you to state your names for the record and proceed, but before you do that, I just want to make a special thank you to those folks who have flown in from a very long distance to be with us today, we'll be hearing from you, we look forward to that. Because you traveled a long way, we're going to give you all the time you want to give us the benefit of your views, and we thank you for coming all this way and waiting patiently to speak, but certainly it is our protocol to put the administration on first, and they have a lengthy statement, and I hope that's good news for Intro 694. It better be, if I'm going to listen to all this testimony, hint, hint. And so okay, and so with that said, I'd ask you to identify

yourselves for the record and proceed with your good testimony, and I guess, is this also your presentation, or is someone else presenting?

MR. MAHNOVSKI: No, it will be somebody else.

CHAIRPERSON GENNARO: Okay, very good. Sergej, thank you and like I said, just state your name and proceed.

MR. MAHNOVSKI: Yes, my name is Sergej Mahnovski.

MR. POSNER: Alex Posner.

CHAIRPERSON GENNARO: Thank you.

MR. MAHNOVSKI: (microphone not turned on)

CHAIRPERSON GENNARO: Okay, we're asking …

MR. MAHNOVSKI: Should I start from the beginning?

CHAIRPERSON GENNARO: Yeah, I guess you'll have to.

MR. MAHNOVSKI: Sorry.

CHAIRPERSON GENNARO: Because the people who are going to read this transcript 50 years from now, or when they make a movie of this

hearing, they won't have everything to go by, so sorry about that, if you could just start again.

MR. MAHNOVSKI: Okay. Good afternoon, Chairman Gennaro and members of the City Council Committee on Environmental Protection, I'm Sergej Mahnovski, Director of Energy Policy for the New York City Mayor's Office, and also Senior Advisor to Deputy Mayor Cas Holloway, I'm joined here by Alex Posner, Project Director of the New York City Department of Design and Construction's Office of Sustainable Design. Thank you for the opportunity to testify today about the role of geothermal in the city's efforts to cultivate sources of renewable energy and reduce greenhouse gas emissions. I testified before this Committee last November about the role that solar energy plays in the city's energy policy, I'm glad to have another opportunity to testify before, Chairman Gennaro, and we appreciate the leadership and interest you have shown on energy policy issues for the city. Intro 694 would require the city to undertake a study that would identify areas most suitable for geothermal energy for building heating, cooling

and electricity generation. The legislation would require that the study focus on a number of areas, including identifying and tracking public and private heating, cooling and electricity generation projects that may be using geothermal energy. In addition, the study would assess the obstacles facing widespread use of geo energy, and the measures needed to increase its use in new construction, alterations of one- and two-family dwellings, multiple dwellings and commercial and institutional buildings and structures. We agree with the goals and objectives of Intro 694 in determining whether geothermal energy is suitable and appropriate throughout the city, and if so how best to leverage the technology. Geothermal energy has the potential to be an efficient resource for heating and cooling. On appropriately-sited buildings in New York City, a well-designed system can replace conventional HVAC equipment and produce annual energy savings on the order of 50%. However, one of the obstacles is the high capital cost right now for installing these systems that make them, traditionally make them cost-prohibitive for widespread application

in the city. So examining the feasibility of geothermal energy in New York City is not really a new topic. In fact the New York City DDC has spent over a decade not only in researching the technology, but also designing and building several important projects, and we're going to hear about them in a little bit. Other city agencies are also in the process of pursuing geothermal projects at their facilities, but before discussing this work, I'd like to give a brief overview of our energy policy, and Chairman, please cut me short if I'm droning on and on and on. But I'd like to give context, because I think it's important to understand the big picture. So in the past several years, the city has pursued a portfolio of initiatives to enhance its energy infrastructure and better manage its energy use. In 2007, as you all know, the city issued PlaNYC, a comprehensive agenda for long-term growth and sustainability. Essential to PlaNYC was the goal of accommodating one million new residents by 2030, while reducing the citywide greenhouse gas footprint by 30% over the same period. As outlined in PlaNYC, the city's energy policy has

three key pillars, enhancing the reliability of our system, supporting projects to reduce our footprint, and also insuring that energy costs borne by consumers in the city are fair. First, reliability of our energy system is vital to insure continued operation of critical facilities such as wastewater treatment plants and hospitals, and to protect our vulnerable populations. Insuring the reliability of the power system is directly under the purview of our regulators and Con Edison, however the city is an important partner in coordinating power restoration efforts and other efforts with utilities during emergency events, such as last year's historic peak load day on July 26th, and Hurricane Irene, both of which placed strains on our local infrastructure. So in order to achieve our environmental and greenhouse gas emissions goals, our top concern is the city's one million buildings, which are actually responsible for 80% of our greenhouse gas emissions. In other cities that ratio is quite different, in some cases 50-50, but in our case it's 80% of emissions come from our buildings, so we have a very building-centric policy, if you

will, and we think buildings are incredibly important assets in our energy strategy. So we've endeavored to actually understand the very DNA of our building stock, and have rigorously assessed opportunities to promote energy efficiency, number one, which we think is the most cost-effective strategy, but also clean distributed generation and onsite renewables are an important part of that package. In late 2009 we passed a suite of legislation known as the Greater Greener Buildings Plan, which requires buildings over 50,000 square feet to undertake cost-effective efficiency measures. These buildings represent just 2% of our total building stock, but they're responsible for 43% of total electricity consumption, making these laws both targeted and high-impact. So to date over two billion square feet of real estate has complied with Local Law 83 and undergone the EPA's benchmarking process, to measure their energy and water consumption. The resulting data repository is the largest ever assembled in history by a city, and as the data becomes public, it will be a key driver for private sector investment in energy efficiency. Based on the

recommendations of the green codes task force, we also continue to update our local building and construction codes to remove impediments and open up opportunities for energy efficiency and renewables development, so city government is also taking a lead, our goal is a 30% greenhouse gas reduction by 2017, rather than 2030. To achieve this goal we have allocated roughly 10% of our $800 million energy budget, or $80 million a year, to reduce energy consumption in buildings and invest in clean distributed generation and renewables. So to give you a snapshot of where we are, since 2008 we've completed about 149 energy retrofit projects, which has saved the city about $6 million in energy costs. When combined with projects that are currently under design and construction, the city is expecting to save about $42 million in annual energy costs. There are about 1,000 more audits and retrofits in the pipeline to meet our target and to comply with the Greater Greener Buildings Plan. To leverage the city's commitment to an accelerated timeline of reducing greenhouse gas emissions, Mayor Bloomberg challenged 30 of our leading universities and

hospitals to also reduce their emissions by 30% by 2017. All of these institutions are now aggressively working towards this target, and several have already surpassed it. So we've undertaken a comprehensive program to transition away from the most polluting fuels that generate our energy, as part of our PlaNYC goal to have the cleanest air quality of any major U.S. city, the Department of Environmental Protection passed regulations last spring to eliminate #6 and #4 heavy fuel oil in buildings. So to accelerate the adoption of the cleanest fuels, and that means natural gas, #2 fuel oil and biofuels, we have launched a clean heat program to provide technical assistance and financing to buildings that are seeking to convert. We think this is a really important program. Over the past year alone, well over 400 buildings have converted from #6 and #4 heating oil to natural gas and #2. Another key challenge, again to put it in context, is for New York City to modernize and expand our energy infrastructure. Our power plants are starting to age, and our power and gas imports are constrained. So as a result, the city supported

the development of Astoria Energy II, which came online last summer, it's a state-of-the-art combined cycle gas turbine plant. The city is also supportive of new gas transmission infrastructure to come into the city, such as the Spectrum in the Rockaways who runs Rockaways' pipelines, and primarily to accelerate the phase-out of heavy fuel oils and to improve the reliability and deliverability of energy within our network. These will be the first major new gas transmission lines to serve the city directly in almost 40 years, and will help utilities meet growing peak gas demand as the economy rebounds and customers switch away from more expensive and polluting heavy fuel oils. With respect to distributed generation and renewables, we're aggressively working to develop them in the city, and that includes solar, offshore wind, co-generation, biogas, and now geothermal. Since 2007, the city has worked with the Department of Energy, Con Ed and other stakeholders to remove regulatory barriers to developing solar energy, and this would apply to any distributed technology, so I think it's important to put it in

context. With state legislature approval in 2008, we created the property tax abatement that as of last year has provided incentives for over 150 projects totaling close to three megawatts of installed power. So we're working with developers to build solar projects on the most favorable and under-utilized municipal assets, such as wastewater treatment plants, large roofs that the city owns, and potential landfills. So through a comprehensive strategy that incentivizes investment in solar in the private market and leverages the building footprint in the city, we're on track to generate a cumulative 45 megawatts of power throughout the city potentially by 2015, which is enough to nearly power 9,000 homes. And I'm going to cut through some of this testimony, because I know we're going to be strapped for time, but another initiative on renewables that we're supportive of is offshore wind, and we've been working closely with our stakeholders, our utilities, NYPA, LIPA, and Con Ed, to look at the potential development of 350 megawatts offshore, which we think is a potentially transformative investment. And then

another piece of the puzzle is co-generation, or highly-efficient combined heat and power plants. So we're developing co-generation plants at Riker's Island and at the police academy in College Point Queens, which would total about 50 megawatts of capacity. We're also working with the utilities to streamline the permitting and interconnection process, and also working with our regulators to make it a more sensible investment for the private sector as well. Another piece of this is utilizing some of our waste gases, primarily our biogas from landfill and wastewater treatment plants, so in some cases we're looking seriously at co-generation facilities which would be fueled with our anaerobic digester gas, and I think what I think is a very interesting project is one that we are … we will soon launch an innovative project at Newtown Creek with our partners National Grid, to basically purify anaerobic digester gas from the largest wastewater treatment plant in the city and inject it back into the gas utility network, which is almost unprecedented, I think it's one of the only such examples in the nation to do that. So we think

the biogas and co-generation projects will combined help us meet 10% of our 30% goal. So with that said, I thank you for humoring me on that. I'd like to share with you what we know about geothermal technology and its potential in the city. So geothermal or ground source heat pump system, is a well-established although often-overlooked energy-efficient alternative to conventional HVAC systems for indoor heating and cooling. A ground source pumps taps into a significant reservoir of heat energy that is contained in rock, soil and groundwater within a few hundred feet below the ground surface. Sub-surface temperatures remain relatively constant throughout the year, which allows them to serve as a heat source during the cold months of the year, when air temperatures below the ground, and a heat sink during the warm months of the year, when the ground is cooler than the outside. So to take advantage of this temperature differential, bore holes are drilled in various configurations to form wells or loops, and aqueous solutions are pumped through to make contact and heat exchange with the sub-surface environment. Several types

of geothermal heat exchange systems exist, these include open-loop wells, which circulate water from underground aquifers through heat exchangers, close-loop wells, which circulate aqueous solutions through a field of relatively-shallow plastic pipewells, and finally standing-column wells, which are much deeper wells, often drilled into bedrock, that tend to be more efficient because the aqueous solution transfers heat energy directly from the bedrock. So as you all know, New York City's geology is complex and varied, and as noted in the DDC's publication, the geothermal heat pump manual of 2002, which is being updated, so generally speaking, in much of Manhattan, the Bronx and Staten Island, the bedrock is located close to or at the land surface. Given the geologic conditions and also the greater density of building sites, geothermal projects in Manhattan and the Bronx tend to employ standing column wells, which have less of a land footprint, but must be inserted up to 2,000 feet below the surface to reach optimal temperatures. In much of Brooklyn and Queens, on the other hand, the land surface generally consists of unconsolidated

sedimentary deposits that often contain groundwater. These locations would tend to provide greater space availability, are typically well-suited for open-loop systems that take advantage of groundwater flow for heat exchange, and generally reach depths of around 500, or up to 500 feet. Closed-loop systems can be built at a depth of up to 500 feet in any of the sub-surface conditions in New York City, but require larger land footprints than both the standing-column and open-loop systems. So the key story is the capital cost for ground-source heat pump systems are generally higher than traditional HVAC systems due to the cost of construction and the heat transfer wellfield. In urban settings like New York City, wellfield costs are likely to be higher due to space constraints, and the need to undertake more vertical borings. Paybacks typically range, and they're a wide range from what we've seen, from seven to up to 40 years, depending on the sub-surface conditions and the depth of boring. So in some cases at the upper end you're falling outside the reasonable payback period, at the low end you're in the ballpark. So

while geothermal systems can be attractive and have the potential to reduce annual operating costs up to 50%, the challenge is that capital cost and how to incentivize it and how to account for it. So in most cases policy support would be required to develop projects with attractive payback periods. There are a few concerns that have been voiced by DEP concerning the use of geothermal, and let me state those. DEP is going to promulgate a rule governing drilling in the city by the end of this year. The proposed rule would restrict drilling and/or excavation in close proximity to the city's water supply infrastructure, particularly aqueducts, tunnels and shafts. It will also force restrictions on how close drilling and/or excavation can come above the crown below the invert or horizontally from the center line of an aqueduct or tunnel and horizontally from a shaft. It also describes the requirements for conducting drilling and/or excavation. All of these criteria will help protect the city's critical water infrastructure from contamination and physical damage. So at this point I would like to invite Alex Posner, who

is right next to me, Project Director at DDC's Office of Sustainable Design, to share his experience designing and constructing geothermal systems in New York City, and of course I'd be happy to take any questions after he's done.

CHAIRPERSON GENNARO: Sure, and I just wanted to make sure that at some point we're going to hear something about Intro 694.

MR. MAHNOVSKI: Ah.

CHAIRPERSON GENNARO: Are we going to hear something about Intro 694? That's what the hearing is about.

MR. MAHNOVSKI: Okay, shall we wrap up this, and then we can- -

CHAIRPERSON GENNARO: (Interposing) Oh sure, sure, and then we'll do that, yeah.

MR. MAHNOVSKI: Because I think it will … some of what he will be testifying will help partly address that.

CHAIRPERSON GENNARO: Sure. Okay, go ahead, Mr. Posner.

MR. POSNER: Okay. Thank you, Chairman Gennaro, for the opportunity to present today regarding the feasibility of geothermal

energy in New York City. As a licensed professional geologist and project director at DDC, I've had the pleasure of working on the development of five geothermal projects, three of which have already been completed approximately three years ago, and am currently involved in several more on the design and development. I'd like to share some of the lessons learned from our work over the past decade and thoughts about the future feasibility of this technology in New York City. There are a handful of successful examples of geothermal energy systems installed in New York City, standing-column wells, or standing-column systems have been installed in Manhattan and Battery Park's City Park's conservatory offices, Columbia University and a residential tower at 471 Washington Street in Tribeca. One project has also been installed at the Bronx Zoo lion house, open-loop systems were installed at the Queens Botanical Garden and Brooklyn Children's Museum, and closed-loop systems were installed at the tickets booth in Times Square Manhattan and the New York City Housing Authority development in Far Rockaway Queens. PS 62, a net-zero energy school,

is planning to install a large closed-loop system at Staten Island, in addition to Cornell University's proposal for 400 closed-loop wells on Roosevelt Island for the New York City Tech Building. The Department of Design and Construction is also currently completing construction for the closed-loop systems at the Weeksville Heritage Center in Brooklyn and at the Snug Harbor Cultural Center in Staten Island. In the early 2000's, the Department of Design and Construction's Office of Sustainable Design began researching geothermal technology, culminating in the 2002 publication, DDC's geothermal heat pump manual. As you know, DDC is responsible for designing and building the majority of new city government facilities, aside from schools, and also much of its right-of-way infrastructure. Our research efforts were not only intended to inform our own projects, but also to serve as a guide for the public sector. Since publication of the geothermal manual, DDC has completed construction of five different projects. The first one is the Queens Botanical Garden, which was a LEED platinum building, the cooling load is approximately 37

tons, which is a relatively small building. This is an open-loop system design which utilizes the expansive groundwater aquifers on Long Island. This facility utilizes one supply well drilled to approximately 300 feet and two diffusion wells, which are also known as return wells, which return the used groundwater back to the same aquifer. This system uses water as a heat transfer medium, and the rate at which groundwater is pumped in gallons per minute is dependent on the building's heating and cooling load. In other words, the greater the load, there will be a greater demand for pumping faster. The maximum pumping rate at Queens Botanical Garden is approximately 160 gallons per minute. A DEC-Long Island well permit is required to operate the system, even though the water is returned back to the same aquifer. Mineral precipitation and iron-related bacteria can become a problem in these systems if it's not properly managed and treated. Brooklyn Children's Museum, which was our second project which went online approximately three years ago, it's located in Crown Heights, Brooklyn, it's approximately 275 tons of cooling capacity. This again, just like

the Queens Botanical Garden, is an open-loop system design, which uses an aquifer. This aquifer is the sand and gravel type. In this situation, because the heating and cooling loads are much greater, it's a much larger building, we have two supply and two diffusion wells at this building. Again, a Long Island well permit is required from DEC, which regulates groundwater usage throughout the state. Okay, the third project is the Bronx Zoo lion house, which is the Madagascar exhibit. This uses a different type of system, it's a standing-column well, it's approximately 275 tons, this is an historic building. This type of system is the most expensive out of all the three systems. We have five 1,500-foot wells drilled into competent fractured bedrock. In this type of system, small amounts of groundwater are pumped through a central pipe in the well, it goes down the well and is returned back at the top of the well down the outer annulus as it exchanges heat with the surrounding bedrock. These systems require a mining permit from the New York State DEC's Division of Mineral Resources only if the drilling

is … only if the drilling goes below 500 feet. Depth is generally dependent on the thermal conductance of the rock, which is the medium primarily used for heat transfer of energy. Okay, our third project, the Weeksville Heritage Museum, which is located in Crown Heights, Brooklyn, this is a 108-ton cooling load, this is a closed-loop system which incorporates 48 closed-loop bore holes down to approximately 400 feet. We use a plastic tubing with a U-bend at the bottom which is inserted into each bore hole and then grouted in place. Subsequently the tubing from each of the 48 bore holes is connected to each other in a circuit and feeds into a header and eventually the building's HVAC system. A water or anti-freeze-type solution is circulated through the tubing via pumps, which pick up the heat energy from the sub-surface and transfers it back to the heat pumps. There is no contact with groundwater in this system, therefore state permits for groundwater usage are not required. These systems are slightly less efficient than the other systems, but require very low maintenance, which is actually a bonus to many city facilities, which

have virtually no maintenance staff. Okay, our last project is Snug Harbor Cultural Center, which is located on the north shore of Staten Island. This is a closed-loop system, which is actually in construction as we speak. The cooling load is projected to be approximately 91 tons, and will utilize 32 bore holes approximately 500 feet deep. Again, they're all connected to each, each go into a header, and then go directly into the building, which utilizes the heat pump system. This project takes advantage of the large site which is available on the property, which is generally required for these systems. It is also a perfect match because it is an historic building and therefore cannot utilize a cooling tower on the building or the surrounding property. After a decade of learning experience, the Department of Design and Construction is currently developing an updated manual on the geothermal technologies, which we expect to release this fall. The manual will provide more detailed geologic maps and a site feasibility guideline. It will also outline relevant regulations pertaining to geothermal development, and finally, it will provide a

detailed description of DDC's completed projects and other relevant case studies. Once this study is complete, we anticipate reviewing Intro 694 more closely and identifying what portions of the legislation may have been covered, and what the next steps are in further reviewing this technology. After this review, we will make sure to engage with the City Council, especially you, Chairman Gennaro, on how we can work together to make further progress on this important policy matter. Thank you for the opportunity to testify, we look forward to listening to today's testimony and further discussions with the Council on the study proposed by this legislation, as well as the potential benefits they could yield in shaping and enhancing the city's renewable efforts.

CHAIRPERSON GENNARO: Thank you. Thank you for your statements, for your work that … all the work that the Bloomberg administration has done on all these various endeavors that led to a statement such as this to be able to be written. Before I make comments or pose questions, I want to recognize that we're joined by Council Members Vallone, Levin and Lander, I'm

grateful to have them all with us here today. We are joined by Council Member Koppell, who could only stay briefly, but he is one of the co-sponsors of 694, and we're grateful for that. Yeah, let me just kind of stroll through the first part of the statement, and part of my mantra here is that when we work together, we can really get things done. We're talking about the New York City law that mandates a 30% reduction in greenhouse gas emissions in the city government sector by 2017, and the overall city by 2030, which was written by this Council, by me, actually. And when we, you had your commercial, I'm going to have my commercial. And so, greener, greater buildings planned in two of … like the ones you cite here, also written by me, and I'd like the number for them, like #6, that couldn't have been done without the cooperation of the Council, you know, you guys had the ability to like nuke six, but in order to tweak four, you needed us to do that.

MR. POSNER: Absolutely.

CHAIRPERSON GENNARO: The bio was me, and so there are many good things that we can

do when we work together, but the administration is kind of always the same thing, that they don't really want to work with the Council unless they like absolutely have to, like at gunpoint. And that's okay, but we've got a good track record when we do partner, and no one wants to do like the hydro thing also, that was just like something that like we shouldn't have done, that we shouldn't do, because the administration was looking at it, and they didn't need the Council kind of like sticking its nose in. But as I said at the outset before we really got started in the hearing, that we have to reduce things to local, and had we not done the 2007 New York City Climate Protection Act, which mandates a 30% reduction, we wouldn't be here today. And so this … and so what we really wanted to find out is, and you guys are the experts, I'm not, is some formal law by the Council that would mandate the kind of analysis and the kind of information called for in 694, it either makes sense to do that or it doesn't. And it seems that it makes sense on some level, because this is something that's already been done once upon a time, ten years ago, a long time ago,

when technology was different, or whatever, we've come a long way since then, and it's underway now, and who's to say, when we have a new administration and a new Council, that they're going to want to continue to do that, right? They may just sort of give up on geothermal, they can give up on global warming, they can give up on like whatever they want, and so we're just trying to keep our good work going forward. And your statement does a very good job of talking about, you know, we could do it in hard rock geology, we could do it in soft rock geology, we could do it large footprint, we can do it with a small footprint, we could do it shallow, we can do it deep, we can do it high-maintenance, we can do it low-maintenance, and so it's all here. And so it looks like you guys are doing a pretty good imitation of people who care about this technology and are putting a lot of brain waves and a lot of the city's money into doing it, which kind of entices me to say, okay, why don't we just make a whole party of this whole thing and just see if we can really try to expand it by doing things like you say in your statement, by doing some kind of

substantial policy support, is like the euphemism that you put in there, that's what we do. So that was really my question, that's what like this whole initiative is, whether or not we even need this kind of information to be generated along the lines of Intro 694. And the way that 694 spells it out, is it any good or is it silly, and we should do it a little different way, and then I'm fine with that. And whether we need things like substantial policy support, that's what we do. But instead we're told, well, we're doing our own thing, and we'll let you know when we get it done. I'm just getting cranky, and so but I want to applaud all the good work that's been done in all the various boroughs, and the fact that this has been going on a long time, I'm just trying to help. I'm just trying to help, and I don't want to be cranky, but I do want to get the administration earlier rather than later on the record as to what we can do with regard to 694, if it makes sense. If it doesn't make sense, you can just tell me, I'm a big boy, I mean, I've heard that before, that, Mr. Chairman, we really should be doing some other things that are like more …

that are a better use of our time than this particular initiative, a lot of other things, we should do solar, we should do this, we should do that. And so I can really kind of take anything, but just, well, we're kind of working on it, and we'll see, and we'll like let you know when we're ready to let you know. But like the hearing is today, and so I felt like I had to get that out, and so I'll let you respond.

MR. MAHNOVSKI: Thank you, Chairman, and if I may rephrase actually that ending a little bit, I mean, first of all, thank you for your leadership. I think we do want New York City to be at the cutting edge of the technological innovation. I think between the administration and the City Council, I think we've made some tremendous progress, and I think- -

CHAIRPERSON GENNARO: (Interposing) It's been really good, we've worked together, it's great. People say, aren't you threatened by the Office of Long-Term Supply and Sustainability and the fact that like you're the Chairman of the Committee but you've got the greenest Mayor that the world has ever known? No, that doesn't

threaten me a bit, that just means I can get really good stuff done. So that's really all I want to do, and I want to leave post-it notes and lots of work for the people that come after us to carry on this work. But I'm stealing your dime now.

MR. MAHNOVSKI: No, and actually the reason we had so much detail about geothermals that we have started to take a look at, I mean, DDC is really the one that had a long-standing relationship with this technology. The fact that we … I mean, we think that it's potentially very interesting, and we think it can be part of the portfolio, otherwise we wouldn't have actually delved as deeply into it. And we think that as a city we should be supportive of technologies that are still ironing out the kinks and really trying to understand where the balance of systems costs are. And so a concerted strategy is really important, otherwise it falls by the wayside. So I think that- -

CHAIRPERSON GENNARO: (Interposing) So far you're just making my point for Intro 694, and I certainly appreciate that, but keep going.

MR. MAHNOVSKI: Yeah, so I think the devil is always in the details on how we structure … every study needs to be streamlined to the point where it actually can yield actual knowledge, insight and investment.

CHAIRPERSON GENNARO: Right.

MR. MAHNOVSKI: So- -

CHAIRPERSON GENNARO: (Interposing) And I'm fine with that.

MR. MAHNOVSKI: Yeah.

CHAIRPERSON GENNARO: And I'm not like the oracle of geothermal, and I'd welcome those kinds of brainwaves, because if we're going to actually do a piece of legislation and make people do stuff, it should be stuff that's very helpful.

MR. MAHNOVSKI: And so rather than us telling you that we'll get back to you, I think that should be rephrased, because I think that's not actually our intention. What we're saying, I think, is that there is a technical component that is ongoing right now that might answer part of the study that you envision.

CHAIRPERSON GENNARO: Right.

MR. MAHNOVSKI: But there's going to be a piece that's still missing that needs to be done looking at the economic feasibility, and the question is how to do that. We think it should be structured around the existing buildings primarily, we also think that we should also bring perhaps NYSERDA to the table, they're the ones who operate much of the policy support. They did a study recently looking at solar for the state. So to the extent that we can bring some of the other partners to the table who would be offering perhaps some ratepayer money to the table, that might be a way to structure it, so maybe it's a combination of the technical study and work we do in partnership with NYSERDA. Those would be, I think, the building blocks that would I think reach the target that you're looking for.

CHAIRPERSON GENNARO: Sure, sure. I'm sitting here on my side of the table, figuring out what we can do in concert with entities like NYSERDA, with the industry that's well-represented here, to try to move the ball forward in some productive government way, you know what I mean, that's like not an oxymoron. I just want to it to

be right, and I want it to be right, I want it to be good, and I don't want to wait. And so I'm all for the commencement of some serious dialogue on how we do that, or just to be told that this is like not a good idea, and I should go fish in some other pond for some roadmap to 30% greenhouse gas reduction, and what the sustainable utopia that we all want to be living in in 2030. And if this is not a brick on like the yellow brick road to get there, I'm a big boy and I can take it. But if it is a possibility, we should get going.

MR. MAHNOVSKI: We think it's a good idea, with the following caveat, so long as the flexibility to craft the scope of the study in a way in which we think it will have the greatest impact, and as tightly crafted as possible, the biggest bang for the buck study, then it's a good idea. So that's the key, I think.

CHAIRPERSON GENNARO: Right, that's what I need you for, because you guys do this all the time, and we don't have the same level of brainwaves on this side of the table that you have on that side of the table, which is fine. We're different kinds of brainwaves, this is what you

actually do, there's people in the administration doing this.

COUNCIL MEMBER VALLONE, JR.: Mr. Chairman, they're generating power from their brainwaves?

CHAIRPERSON GENNARO: Yeah, and I wrote the bill too, that required that, yeah. The first in the nation, you know what I mean. But I--

MR. MAHNOVSKI: (Interposing) And Mr. Chairman, again, apologies, I think we misworded the end of that statement. I think partly because we scrambled in a short period of time to pull this together, so that we didn't mean to seem flippant by saying we'll get back to you, that's not in fact what … that is not our message actually. We think … I'm going to restate it for the record, we think it's a good idea, so long as the scope of … so long as we have a lot of input into the scope of the study.

CHAIRPERSON GENNARO: Right.

MR. MAHNOVSKI: Because I think we're pretty good at doing that.

CHAIRPERSON GENNARO: Yes.

MR. MAHNOVSKI: And then it can be a really good study, and it can serve the industry and the city and everybody very well, so that, I think that's- -

CHAIRPERSON GENNARO: (Interposing) That would be great, and just let me sort of close with the amount of trust and respect I have for everyone on the Mayor's environmental team, which is a very big team, which you are a key player on. And so I really trust the Bloomberg administration to help this Council craft the kind of study that will do what needs to be done and as we … because we have a very, very good batting average when we work together, and the type of engagement that I've had with the Bloomberg administration up until now on many critical environmental issues has been wonderful, and I just want to keep that going and just for the folks here who flew in from long distances, let me tell you about some of the environmental cooperation I've gotten from the Bloomberg administration when I put forward a bill a number of years ago to reduce greenhouse gas emissions by 20%, and the city, the Bloomberg administration came back and said, okay, we'll see

you 20, we'll raise you 10 and make it 30, and we'll build this like huge think tank where we'll do like a full emissions inventory and I'm like, oh, that's a pretty good offer, whereas other City Councils throughout the country are going to their partners in government saying we're not interested in anything like that. So this has been the kind of cooperation, this has been the great things that we've been able to do together. And so I really welcome this opportunity to start working on this and make this study all that it can be, and I'm all gratitude to you and to the Bloomberg administration for trying to do this, and adding this sort of new plank, meaning like a law, to the environmental fortress that has been … I'm just getting nuts now, okay, but you know what I mean, my heart's in the right place, your heart and mind is in the right place, and I really thought that working with you on this and thank you so much for being here today. I want to ask my colleagues … oh, and I will recognize … oh Pete, do you want to get recognized, or I had you down here.

COUNCIL MEMBER VALLONE, JR.: I'm recognized.

CHAIRPERSON GENNARO: Okay, no, I meant, you were down. Oh, is this for questions or is this for members who are present here, Samara?

MS. SWANSTON: Just for those who are present.

CHAIRPERSON GENNARO: Who are present. Okay, okay, I thought this was the question list, sorry about that.

MS. SWANSTON: No, no questions.

CHAIRPERSON GENNARO: Sorry Pete, good seeing you. Okay. Brad? Anything? I recognize Council Member Lander.

COUNCIL MEMBER LANDER: Thank you, thanks for being here and for the collaborative work. I guess my question is just a little bit about, and it kind it goes down this road of how we capture what we're learning, not solely about geothermal, but more broadly across the array of different audit and enactment work that we're doing, and there seems to be an enormous amount between what Greater Greener is requiring in general on the 50,000 square foot buildings and specifically then on the municipal infrastructure,

we're learning a lot about what we think is going to work and what's not going to work, how to finance it, how to pay for it. How is all of that being gathered in a systematic way that's going to help drive the market more effectively and figure out what makes sense on its own, and folks should just do it; what makes sense if the financing tools are in place, but market-rate financing needs to see an opportunity it hasn't seen; what makes sense with a little bit of subsidy and is worth a little bit of subsidy; and what seemed like a cool idea but maybe doesn't make sense? So how are we gathering that and figuring out how to make both policy decisions and help encourage and drive the market in the years to come?

MR. MAHNOVSKI: Well, on city government assets obviously we have a good handle because we have the comprehensive database, and this is really DCAS and unfortunately the DCAS Commissioner and Deputy Commissioner aren't here, but I think with the municipal asset base we've got a very good handle on that. How do we actually track citywide what happens? Well, there's a couple of different efforts going on. I

mean, if you look at CUNY, the CUNY solar map is really they're tracking the permit process and projects that are under construction across the city, not just on the city government footprint. So we have that piece. The other part of this is the benchmarking, which right now we're actually getting very close to finishing up our report. We think that's going to be, and obviously you're all very, very familiar with this, but I think this is going to revolutionize the energy efficiency industry in many ways, because once you collect information for buildings 50,000 square feet and above, once you marry that with audit data coming down the road, you're going to have, as I talked about, really the DNA of these buildings, how they consume energy, and potentially how they produce energy, and which we can actually look at energy integration, be it renewables or energy efficiency, much more closely. So that data is starting to really come and take life, and so if you pull these different efforts together, I think the database of information we're going to have on buildings, be it the rooftop or the envelope, I think we're … really no city can compare in the

U.S. at least with New York City. And that's going to take a couple of years to really build, but we're building the building blocks right now, and that's when you can do some more in-depth financial analysis, some more in-depth technical analysis. And it's the stuff that's not necessarily that sexy on paper, but it's really the building blocks of making really intelligent decisions, and we think that in credit to all of you and of the administration I think for really pushing the benchmarking legislation. So I think that's the key.

COUNCIL MEMBER LANDER: All right, but I guess maybe on … especially on the municipal infrastructure, tell me a little more about what's being done, like where is the data, both more anecdotal and more systematic, on what we're learning about what makes sense to do where, being brought together in a way that … from the post-it notes that the Chairman referred to for future administrations, presumably other cities across the country that don't have our scale of resources and if that's meant that we've made … so yeah.

MR. MAHNOVSKI: Yeah, it's a good

question. So I don't have all the data in front of me, that's really DCAS that manages that, but we have a … there's a database of projects … well, first of all we have a database of all municipal assets, and we're upgrading the IT infrastructure that is able, that we're able to query buildings and understand their load. But as far as the projects, we very rigorously track where the projects are in design and construction and delivery, to see whether we're reaching our greenhouse gas target. So that's really Deputy Commissioner Ariella Maron at DCAS who could speak more eloquently about this, but that is something that is, I think, a very rigorous process, the payback periods are looked at at every investment, and we have this pool of resources, as I said, every year to spend on those projects, and so I think that tremendous amount of effort and energy goes into this, and there is a track record and a database that's, I think, very transparent, so that is available, it will be available to whoever is … whatever administration takes over after next year.

COUNCIL MEMBER LANDER: Thank you.

Thank you, Mr. Chairman.

CHAIRPERSON GENNARO: Thank you, Brad, and just, I guess, a question out of curiosity, with regard to where you're actually positioned, it was my understanding once upon a time you were at DEP, now you've moved over to … just tell me about that.

MR. MAHNOVSKI: Yes, when Cass Holloway went from Commissioner of DEP to Deputy Mayor, so I'm his lead on energy in the Mayor's Office.

CHAIRPERSON GENNARO: Okay, so because once upon a time the, kind of like the energy center was over like EDC or DGL and then it went- -

MR. MAHNOVSKI: (Interposing) It went to DEP.

CHAIRPERSON GENNARO: It went to DEP.

MR. MAHNOVSKI: Yes.

CHAIRPERSON GENNARO: And now it's at the Mayor's Office under you.

MR. MAHNOVSKI: Yes, and I oversee the energy folks at DEP. And we work very

closely, we're not too bureaucratic about it, but we have … it's the same group, the same cast of characters.

CHAIRPERSON GENNARO: Sure, sure. I mean, I think it speaks to the Mayor's commitment on how serious he is about energy to put this right in the Mayor's Office, and I applaud that, and so various people doing energy-related things throughout the administration, and I think it's a good way to work, and although the Mayor may be term-limited and who knows what's going to happen to the deputy mayors, you're not term-limited and you can't go anywhere in the next administration, so I- -

MR. MAHNOVSKI: (Interposing) I'm here as long as they want me.

CHAIRPERSON GENNARO: Okay, and that's where we're fortunate to have both of you, and we really appreciate your dedicated efforts, and I want to thank the administration for its wonderful commitment, for doing so much energy stuff on so many different fronts and really being a beacon for urban environmental sustainability and everyone is going to school on us, and that's

okay. So I want to thank you both for being here, and I want to thank the administration for having this testimony. I want to thank you for the handshake and that we're going to be working on this, and I'd like to thank Reggie Thomas for bringing this all together, for being the maestro that helps to make these hearings happen. So I'm very happy with today's testimony and to the meeting of the minds we have with the administration. So thanks very much and we appreciate it- -

MR. MAHNOVSKI: (Interposing) Thank you, Chairman and Committee. Thank you.

CHAIRPERSON GENNARO: You bet, and I know you will leave people behind to hear some of the good testimony from people that have come from far and wide, and so this is a good opportunity to put a lot of movers on this issue in the room and we want to hear what they have to say. I know that you would want to have the benefit of their views as well.

MR. MAHNOVSKI: Thanks very much.

CHAIRPERSON GENNARO: Thanks so much, we appreciate it.

MR. MAHNOVSKI: I appreciate it.

MS. SWANSTON: We have John- -

CHAIRPERSON GENNARO: (Interposing) Just hold it a second, I'm not … One moment, we're just figuring a couple of things out here. Okay, sorry for the delay. We got it now, okay, and so we're going to call the next panel, John, it looks like Rhyner, John Rhyner, P.W. Grosser Consulting, also on the panel … and just because people are on the same panel, it doesn't indicate that they work together or share the same views or whatever, it's just they're physically sitting next to each other giving testimony, and nothing more than that should be read into it. So we mentioned Mr. Rhyner, it looks like Paul Andrews Collins, I believe, from P.A. Collins PE, John DiEnna, I believe, Sr. Okay, so we've got everybody here, and the panel after this, just to … so there will be this panel that we will hear from, and then Rick Bostian from Water Furnace, Paul Bony from Climate Master, that will be the panel after this one, and the last panel, James McKean, Rick Bell and Terence O'Brien, Terry's here? Okay. Oh, okay, very good. Great, so that is the lineup.

I'm having my picture taken. I would have gotten a haircut had I known, thanks. And thanks very much for being here, it looks like we have a … so Mr. Rhyner … oh, we have three, forgive me. Okay, it is customary in our Committee to swear in the panels, we're going to proceed with that, you saw the last panel do that. I'm going to ask Samara to give the oath, and then after that each can testify in turn, starting from my left to my right, and if you have a statement, you can give those to the sergeants and they'll give that to us, and we'll follow along. So Samara, please proceed.

MS. SWANSTON: Can you please raise your right hands? Do you swear or affirm to tell the truth, the whole truth, and nothing but the truth today.

MR. RHYNER: I do.

CHAIRPERSON GENNARO: Thanks, thanks very much, and I just want to make sure that I have statements and … do we have three different statements? Okay, all right, okay. I've got this one. Okay, it looks like Mr. Grosser is going to testify first, and I … yes, oh

pardon me, the Grosser Firm, Mr. Rhyner, right? Okay. I have that statement, and then just get the other statements to me. So please state your name for the record and proceed.

MR. RHYNER: Okay, my name is John Rhyner, with P.W. Grosser Consulting, and good morning, Chairman Gennaro and Council members and invited guests, I too want to thank you for the opportunity to address you today regarding this proposed legislation. I'm a licensed professional geologist and senior manager with P.W. Grosser, our main office is in Bohemia, Long Island, New York. We have offices here in Manhattan and Connecticut and Syracuse. I have read the proposed legislation and I was extremely encouraged. My firm has been in the forefront of the geothermal industry in the New York Metropolitan Area for over 20 years, personally I've been involved in the geothermal industry exclusively for the past 12 years. As a practicing geologist, my focus is the portions of these systems that get drilled or installed or constructed in the ground. I'm not a mechanical engineer by trade, I'm a geologist, and the two

parts of these systems have to be integrated, so that's been my focus for as long as I've been working. In the industry most of my experience has been in the five boroughs of New York. I've had the fortunate opportunity to collaborate and interface with numerous city agencies involved with this technology over the years. I've been working with the DDC for over ten years now, with my current firm and with the previous firm, and the DDC is certainly a pioneer in the development of this technology and I really enjoyed the time working with them. Besides assisting the DDC with implementing some of the projects that Mr. Posner mentioned, I also played a large part in developing the update of the geothermal heat pump manual for the DDC, so we're exciting about using that, rolling that resource out to facilitate the industry. Beyond that, I just want to state for the record that everything I'm about to say is my own personal observations and opinions from working in the private sector, and not associated with the DDC, just so they're assured that- -

CHAIRPERSON GENNARO: (Interposing) Sure.

MR. RHYNER: … these are my own experiences, other than those projects. I'm not going to reiterate all of the tremendous benefits regarding energy efficiency and what not that have already been stated, and I know some of the people to follow will state. But I would like to mention a couple of benefits that are perhaps less tangible, less economic-related. Specific to New York City's urban character, the following benefits, I believe, should be considered. The components of these systems are entirely underground, or within the building. They are not on the roofs or exterior parts, they are basically not visible. There are no noisy rooftop chillers or cooling towers, which can detract from the city's skyline or impact occupants in adjoining buildings. For those reasons, these systems are ideal for landlocked structures, as was mentioned, structures with pitched roofs or other limitations or restrictions on exterior improvements, as dictated by the New York City Landmarks Preservation Commission. Moreover these landmark structures can be retrofitted for central air conditioning rather than window units, which also

detract from their aesthetic character. Geothermal heat pump technology can offer air conditioning to such buildings, many of which have never had air conditioning throughout the course of their lifetimes. And that offers fuller use of these structures, in the summertime as well as the wintertime, with central air. Geothermal can facilitate wider adoption of other sustainable technologies, by clearing up the roof that frees up space for green roofs and solar PV installations, okay, because of the no associated rooftop equipment. New York City is in the forefront of construction of LEED-certified buildings. It is clear from the literature sources and references that I have reviewed, a large percentage of buildings achieving LEED certification incorporate geothermal heat pump systems into their design, and that's owing to the high energy efficiencies that can be achieved and the LEED energy credits. The same is true for net zero energy buildings that I have seen in the literature, virtually all the net zero buildings that I've seen discussed in case studies incorporate geothermal technology. So with the

wider adoption of this technology in the city, that can help to secure the city's high ranking in LEED and net zero building development. The GHP, geothermal heat pump system industry is homegrown, as probably will be discussed, the major heat pump manufacturers are nationally-based, they're well-represented. Every geothermal system incorporates a wide range of disciplines of engineering, designers and contractors, most of which are local, as well as the materials for constructing these systems, the heat pumps, the steel casings, the drilling mud and the grout, all that's locally based in this country. Regarding the proposed legislation and the study referenced, I'd like to make four points regarding the concept of the geothermal sub-zones. While sub-surface geologic and hydro-geologic conditions are indeed a critical controlling factor on the type of geothermal systems suited, they are only one of many site-specific, project-specific and owner-specific considerations. I can say with my years of experience, geothermal heat pump systems are viable in virtually all geologic conditions in the city. These other conditions are more the

determining factors. A major factor is the outdoor area available to drill, to drill the wells. And a design of each system requires a site-specific study; that information in conjunction with extensive published data available from the U.S. Geological Survey, as well as the resource, the geothermal heat pump manual from the DDC, all the resources are available there to really assess a site from a geologic perspective, whether it's feasible and what type. So in terms of geologic sub-zones or geothermal sub-zones, I think that may not be necessary, and the resources could be put elsewhere. I would also like to inform the Council of cutting-edge research completed by the New York City Economic Development Corporation and Columbia University that you may not be aware of. Efforts by Columbia and EDC over the years have … are directly addressing today's topic and I was fortunate to have participated in those efforts. Columbia graduate students developed an energy model which grew out of their research into CHP- -

CHAIRPERSON GENNARO: (Interposing) You've got my attention now.

MR. RHYNER: Okay, they got the … they looked at- -

CHAIRPERSON GENNARO: (Interposing) I mean, you had it all along, but I'm just- -

MR. RHYNER: (Interposing) Oh, okay.

CHAIRPERSON GENNARO: I didn't … you know.

MR. RHYNER: Okay.

CHAIRPERSON GENNARO: You just bumped it up a notch.

MR. RHYNER: Okay, good. Columbia and EDC originally looked at the viability of CHP on a block-by-block basis. So they developed an energy model of electrical consumption and heating and cooling demand for all the existing structures on each block in the city. They extended that initial modeling to look at geothermal. My part was to select the most suitable type of geothermal system throughout the city, based on geologic conditions, available land area to drill, and the estimated thermal capacity of the ground underneath those blocks. And we came together and we married our studies and came up with geothermal

viability on a borough-by-borough analysis, on a block-by-block analysis, and that's one of the illustrations that I included in my testimony.

CHAIRPERSON GENNARO: When was this done? I mean, normally I keep my questions for the end, like after the whole panel testifies.

MR. RHYNER: It's probably about two years ago.

CHAIRPERSON GENNARO: I see.

MR. RHYNER: Yes. And that was done through the EDC's Energy Department, which has been since disbanded.

CHAIRPERSON GENNARO: Right.

MR. RHYNER: So I don't know- -

CHAIRPERSON GENNARO: (Interposing) Right, it moved to DEP and now it's at the Mayor's Office.

MR. RHYNER: Yes. So it was quite fascinating, the findings they found, the residential market for geothermal is enormous, ranging from over 75% of the total square footage of the residential in the Bronx to nearly 95% in Staten Island, that's excluding Manhattan. Commercial market ranges from over 20% in the

Bronx to almost 50% in Staten Island, of the total commercial market, again excluding Manhattan. The outer boroughs have the larger geothermal potential, due to greater open outdoor space for drilling and lower densities, and has been stated already, over 900,000 buildings could be feasibly served. And some of their recommendations, which parallel my recommendations for what the Council could consider doing in this legislation, to subsidize training of suppliers for geothermal systems, engineers, architects, contractors; approve geothermal training for New York City Workforce Investment Board grants; provided the building meets initial feasibility screening, sponsor subsidized more-detailed site analysis and a cost-benefit assessment for the private sector; conduct feasibility studies for EDC buildings -- EDC has an enormous building stock -- ease permitting requirements by city agencies; and analyze third party models for financing or applicability in New York City, and I know that will be mentioned too. So, in summary, the market potential and feasibility of this technology is tremendous. I've experienced a willingness with

all of the city's agencies I have dealt with over the past ten years to consider the merits and special considerations for this technology, and that includes the DDC, DOT, DEP, EDC, DCAS and Parks. Besides the private sector opportunities, New York City as the largest landlord in the city has the unique opportunity. We mentioned, Sergej mentioned, DCAS, I'm aware that they're currently implementing energy performance contracts on some of their buildings. I understand that they were to require contractors to consider geothermal technology, and I'm also pleased about the New York City School Construction Authority embarking on their first geothermal project in Staten Island as part of their net zero. I have a couple of comments that I'm left with there, I don't think I need to read those or present them. My recommendations, additional recommendations then, to consider for this local law, this legislation, begin education and training, possibly through university resources at hand. I've given workshops at Bronx Community College, they're held now locally in Manhattan. I did that for a couple of years, and then they kind of dwindled off,

solar and wind, there were still a lot of workshops, but I think the word needs to get out. So contractor training I mentioned, not necessarily a study, but to survey and screen the city's existing building stock for viable candidate buildings, there are certain prerequisites of building size, availability of outdoor areas for drilling and condition, age and efficiency of the existing HVAC system, i.e., is a replacement or upgrade in order. And that's not so much a study, that's more doing a survey and screening, identifying buildings and get to work. That would include the city's landmark historic buildings. I would explore relaxing the permitting requirements, that was a message that came out of the EDC and it's been a personal- -

CHAIRPERSON GENNARO: (Interposing) Right, yeah, I get that a lot.

MR. RHYNER: With the water tunnels and what not, I think there are things that can be … let's see. And the other activities within the proposed study are valid to serving data on the existing GHP systems. There's some good city-owned and operated buildings, there's some private

sector buildings out there that I think would be approachable with our help. Some other resources being developed, Long Island, I just came from a meeting last week, we're starting a Long Island Geothermal Association, and Long Island includes Brooklyn and Queens, so I think we can work close together with the city in that effort.

CHAIRPERSON GENNARO: It would be like a trade association?

MR. RHYNER: It's a grassroots geothermal organization, just like the New England geothermal professionals just started up.

CHAIRPERSON GENNARO: Right.

MR. RHYNER: There's a Connecticut geothermal.

CHAIRPERSON GENNARO: It's a trade association then, right?

MR. RHYNER: It's a trade association, yes. And we're all very excited about that, and we've got a lot of good resources over there.

CHAIRPERSON GENNARO: Is that kicked off yet, or?

MR. RHYNER: Last week was the

foundational meeting.

CHAIRPERSON GENNARO: I see.

MR. RHYNER: Yes, and I can certainly talk to them about our involvement with the city. And that's it, thank you.

CHAIRPERSON GENNARO: Thank you, and thank you, Mr. Rhyner, I'll have questions and comments for you, and I appreciate you coming here and giving us the benefit of your views and I am trained as a geologist, so I- -

MR. RHYNER: (Interposing) That's what I heard.

CHAIRPERSON GENNARO: … hear you. I mean, I don't think I could find the eutectic point on a binary phase diagram any more, but I could try.

MR. RHYNER: Good.

CHAIRPERSON GENNARO: And so I have your statement, and sir?

MR. DiENNA: Jack DiEnna, John DiEnna.

CHAIRPERSON GENNARO: Okay, and do I have your statement?

MR. DiENNA: You should.

CHAIRPERSON GENNARO: Okay, what is your statement?

MR. DiENNA: You should have Geo-nii on the top.

CHAIRPERSON GENNARO: Okay, let me--

MR. DiENNA: (Interposing) I sent it to Samara.

CHAIRPERSON GENNARO: Okay, I need this gentleman's statement. I'm not going to look, I'm going to sit here until it appears in my hands, okay. This isn't hard, the Chairman needs a statement. This is not hard to do. And we're joined by Council Member Crowley. Nice to see you, I'm waiting for my statement.

MR. DiENNA: He does, John has a copy of it he can give you until they find one.

CHAIRPERSON GENNARO: Oh no, just give it to the sergeant, good. Oh okay, well just so I can follow along. Fine, okay. Sorry about that, I didn't mean to make a whole thing about it.

MR. DiENNA: That's okay.

CHAIRPERSON GENNARO: So, Mr.

DiEnna, I'm very happy to have you here, just please state your name for the record and proceed.

MR. DiENNA: Sure. My name is John P. DiEnna, Jr., I'm the Executive Director of the Geothermal National and International Initiative, the Marketing Chairman of the International Ground Source Heat Pump Assocation in Stillwater, Oklahoma, and former director of the Geothermal Heat Pump Consortium, and I'm also currently consulting with New York State Energy Research Development Authority and have worked with them since 2000 in the development of GHP technology in New York State.

CHAIRPERSON GENNARO: Sorry, continue.

MR. DiENNA: That's okay. Chairman Gennaro, Council members and invited guests, thank you very much for the opportunity to address you today regarding facilitating the development of geothermal heat pump technology in New York City. I have read the proposed legislation and I applaud your efforts, but I would suggest that this could be stronger. Let me first tell you, I've been in geothermal technology since 1985, I started when I

was two … no, I'm only kidding. There are over 100 projects right now in the five boroughs currently in operation, so to study geothermal sub-zones seems redundant. I might add that 90% of those 100 jobs, projects, are closed-loop vertical bore. To design a geothermal system, as John stated, there has to be studies done, there's got to be thermal conductivity studies done, there's got to be a number of studies done, including the feasibility, both economically and technically, as to whether it works. So to do a study to look at this seems very, very time-consuming and redundant. This technology is a 60-year-old technology, so I would suggest that a better use of the resources would be to establish standards for the installation of these systems in the five boroughs. Our industry, which I represent, has the accreditation certifications and standards already in place that we will share with you. In fact, currently we are training, professional training development in Albany, actually it's in Saratoga Springs at the Tec-Smart facility under Hudson Valley Community College. As you stated before, geothermal heat pumps use

the earth's thermal properties in conjunction with electricity to provide heating and cooling to facilities such as schools, hospitals, office buildings and houses. It does this by using the energy under our feet, this energy we already own, to deliver space conditioning and water heating to these facilities. This technology offers triple the solutions of energy independence and security, environmental stability and economic prosperity. A recent study conducted by the Rockefeller Foundation and DB Climate Change Advisors makes the point that buildings consume approximately 40% of the world's primary energy and are responsible for 40% of the global carbon emissions. They also state that upgrading or replacing energy-consuming equipment in buildings offers an important capital investment opportunity with the potential for significant economic, climate and employment benefits. They go on to say that investment of this type of initiative could yield more than one trillion of energy savings over ten years, which is equivalent to savings of approximately 30% of the annual electricity spent in the U.S., and according to a report from the U.S. Department of

Energy, 40% of that energy used in buildings is for space conditioning and water heating. The State of Maryland recently passed senate bill 652, which effectively makes geothermal heat pumps an acceptable technology available for renewable energy credits under the state's renewable portfolio of standards. This action recognizes GHP's, geothermal heat pumps, as a renewable energy source that does not need the sun to shine or the wind to blow, and works 24/7, giving utilities credit for the thermal load avoided. I've recently done a survey of projects installed in New Jersey, and after reviewing the work of just two design professionals that they have collectively designed and installed 52,000 tons of capacity, which accounts for over 20 million square feet. The New York City residential market comprises over 66% of the total floor area and the institutional market accounts for another 9.8% in the five boroughs. This points to a major opportunity for geothermal heat pumps to make a dramatic impact in these markets. I've discussed two of the solutions, energy independence and security and environmental stability, but the most

important one, I believe, is economic prosperity. The workforce for this technology is comprised of 90% green-collar workers, and 10% white-collar workers. In a recent industry survey, we found that a commercial project touches 22 job classifications, this does not include the pipe or compressor manufacturer. Currently I'm working with NYSERDA to bring professional development training to New York State and create a stronger sustainable infrastructure. I am also in discussions with some of the PSC commissioners who support the expansion of GHP technology in New York State. I have included with this testimony a report that the Geothermal Heat Pump Consortium did for NYSERDA in 2003, in which we identified the 106 geothermal heat pump system installations across the state, which accounted for a total of 17,387 tons of heating and cooling capacity and served over 6.6 million square feet of facility space. These systems reduced demand by 15.3 megawatts of energy, and accounted for 128.3 megawatts thermal. The report also shows fossil fuel savings, carbon reductions and barrels of crude saved. By the way, as I stated, every

report was done in 2003. In conclusion, I appreciate the opportunity to address the Council and discuss the various benefits that this technology would afford your constituency. I would leave you with one last thought, and that is, geothermal technology is beyond green, it's gold, sitting right below the ground outside your building. Thank you.

CHAIRPERSON GENNARO: Thank you, thank you, very poetic, okay. Thank you. I really you being here, and I'll have questions and comments for the whole panel, I really appreciate your statement. And the slips. Mr. Collins, right?

MR. COLLINS: Yes.

CHAIRPERSON GENNARO: Okay. Do we have a statement? Okay, and this is you here, right?

MR. COLLINS: That's the first page.

CHAIRPERSON GENNARO: Okay, yes. Okay. Please state your name for the record and proceed.

MR. COLLINS: My name is Andrew

Collins, I am the principal of P.A. Collins PE, Consulting Engineers and we are mechanical engineers, New York City-centric, we work in all of the boroughs and surrounding areas. I have prepared a presentation here, which as I've understood that you all understand that we can do it shallow, we can do it deep, we can do it cheaper, more expensive, less efficient, more efficient, so I encourage you all to turn to the last page, which are my suggestions, which run more along a legislative vein.

CHAIRPERSON GENNARO: Right, thank you.

MR. COLLINS: Rather than a geological vein, because I've understood that you all have gotten it.

CHAIRPERSON GENNARO: Okay.

MR. COLLINS: So what I wanted to point out is that as engineers we started working with geothermal in 1996, and have- -

CHAIRPERSON GENNARO: (Interposing) Sir, if you could just speak right into the microphone.

MR. COLLINS: Sure.

CHAIRPERSON GENNARO: So that everybody can hear, that would be great.

MR. COLLINS: Sorry about that. I'm a little bit further away, so I'll raise my voice.

CHAIRPERSON GENNARO: There you go.

MR. COLLINS: So we started working with geothermal installations in 1996, and we found at that time the industry was not very mature at all. And we're now in the year 2012 and we have found that the industry still in the New York City environs is not very mature at all. We haven't attained critical mass. So, because we're consulting engineers, we don't work with one-, two- and three-family building owners or even renters or anybody who might have one very often, we are working with commercial installers, larger buildings. We did the first geothermal installation in Manhattan, which was 9 East 64th Street, it was originally to be an institutional building, later it became a- -

CHAIRPERSON GENNARO: (Interposing) Where was that installation? Where was that?

MR. COLLINS: 9 East 64th Street.

CHAIRPERSON GENNARO: Oh, okay.

MR. COLLINS: It was in conjunction with Cornell University and a couple of other institutions who later had to sell the property, for a variety of reasons which are unknown to me. We then did four buildings right down here on Reade Street, about two blocks north, which if memory serves, 138, 140, 144 and 156 Reade Street. Those are standing-column wells and they're all single-family dwellings, they were sold for very high prices already many years ago, so it doesn't really represent a large market. And I would like to address my remarks today to markets which are larger and will create, if you will, critical mass for the geothermal industry here in New York City. So there are many, many organizations which John and Jack are representatives in the U.S. and also locally. One of them is IGSHPA, which is the International Ground Source Heat Pump Association, and they are based out of Oklahoma, Stillwater, Oklahoma, Oklahoma State University. And they had a big tradition of being drillers from the petroleum industry and then recycled themselves and started looking at geothermal, all of which …

all of the installations involve drilling. So they have not only accreditation functions, I myself am accredited by them as a geo-exchange designer, so we know how to drill holes in the dirt and how to pull heat out of it in the wintertime and how to reject heat to it in the summer, and as part of that accreditation they have established basically a web-based databank where you can go in, and if you are on the eastern end of Long Island or up in Queens or in the Bronx, or wherever you are, you can look and see, well, who is an accredited geothermal installer in my area, who is an engineer who might know about this, who is an HVAC guy who is a person who can drill into the ground, and it's very convenient. Unfortunately, it is a national database, so it's not very dense for New York City. However, we have the ability to create some … create these databanks here and some synergies, because we do have a lot of organizations that are involved with this. Jack had mentioned NYSERDA, if you go into NYSERDA and start searching their site, which is not very friendly, however, there are a lot of PON's, program opportunity notices, which say "you

can get a subsidy for solar, as an owner of a one-, two- or three-family", "you can get a subsidy for purchasing geothermal heat pump equipment". However, there is no single point or place where you can go where that information gets pulled together for you. Now I'm a consulting engineer, so somebody comes to me and says, "You know, I want to do this", and I've got my sources and I can pretty much pull that together for them, and that's one of the things that we do as a consulting engineering firm, somebody comes and wants to do geothermal, you say, "Okay, fine, we're going to pull together an integrated design, construction, and hopefully afterwards maintenance group for you", so we have my firm, which does the inside of the building, we have geothermal consultants who will design the geo exchange. We know all the well drillers in the area, and they are all wildcatters, which is an issue I would like to address specifically. We need to have training for the trades, and I think Jack alluded to that and stated it clearly in some areas, but if you would like to have geothermal for your house, or your one, two, three, even three-family

dwelling, even a small apartment building, five stories, that has perhaps a front setback, it maybe has a parking lot in the back, you're going to repave anyway, so this is the ideal time to drill and put this in here, how do you go about doing that, as a building owner or a building manager? Well, you need to be able to go somewhere. So I would urge you, as part of this study, to figure out how we can start establishing a central clearinghouse where we get Con Edison, NYSERDA, all of them, the national grid which is active in part of the city, all of these different organizations which do have subsidies, do have resources, there is … NYSERDA has a program called the Multi-family Partner Program, MPP, for larger buildings, where they have assigned subsidized consulting engineers who will go out and they will do an energy audit of your building for you, all with NYSERDA moneys, and then help you with the energy-efficient part of the retrofit costs that you have. So they're not going to give you new windows, they will help you get better windows than the ones you could afford, but you have to prove that it's going to pay back. One of the

most important points that I wanted to make today is that Con Edison is generally the electrical power supplier for us here in New York City. They reclassified geothermal energy as a fossil fuel source of energy. Round about the year 2000, about the year 2000, I appeared in front of the Public Service Commission and tried to testify against them, claiming that geothermal is an electrically-driven technology, clearly it is, because we are not mining, we are not pulling any fossil fuels out of the ground, we're really not altering the thermal nature of the ground, because we are … while we are a heating-dominant climate, and we might extract a little bit more heat than we put back in the summertime, generally the systems, if they're properly designed, have a neutral point, right, so we're pulling out just about as much heat as we're putting back in, and the ground is not affected.

CHAIRPERSON GENNARO: Sergeant, I'd just like to ask you to close them, we're getting some noise from the hallways, it's very distracting. Thank you.

MR. COLLINS: So I would encourage

the Council, if it were possible, to address this issue with Con Ed and have geothermal energy, especially for the one-, two- and three-family buildings out there, reclassified as an all-electric rate, so that the operating costs for heating and cooling are reduced. The difference is about, if you take a blended rate, your normal EL1, which is residential, you're paying about 22 to 24 cents for a kilowatt hour, which is very high, it's one of the highest in the world. If you go all-electric, you're down to about 14 cents, so you're looking at saving about 10 cents a kilowatt hour, even when you're watching TV, and that is very attractive to people, and I think we need to make geothermal attractive to everybody that's out there who has a potential interest and may not even realize it. At the same time, national grid, LIPA, NYPA, Con Ed, and NYSERDA at this moment have subsidy programs for photovoltaics. Now geothermal systems on the cooling side would have their peak demand when photovoltaic is also generating the highest amount of electricity, which is during the daytime, the sun is shining, it's hot outside, and this would

help balance out the peak demands between summer and winter. In fact, we were introduced to geothermal by Con Ed in 1996 in a conference where we were invited, because at that time Con Ed was still a utility company. So they owned power generation facilities and also the distribution, they had to maintain everything, they had to meter, they had to bill, they had to do the whole nine yards. They subsequently converted themselves into an ESCO, they no longer own the generation plants, so their interest in balancing the peak air conditioning loads, which is the highest load you would see as a utility company, with a lower peak for heating in winter, has disappeared. So the need to conserve energy and the need to not build large power plants, the need to have distributed generation, has not changed, whether or not Con Ed is an ESCO or not. So I think they need to be brought back into the fold and asked to reclassify geothermal heat pump installations as all-electric. Okay, so that's one of the major points I wanted to make. Moving along, we need to be able to have installers … I'm sorry? Okay, we need installers who are able to

handle the simple kind of installation that one-, two- or three-family house would like to have, and I'm sorry Jim Bose isn't here, because he made a big impression on me when I met him with a drill rig that he was working on, where he claimed he could sit in the front yard of a house, it would be about the size of a golf cart, and he could drill under the house, under the basement, and within a two-foot radius, he could tell you where he would come up on the other side, and that's a loop which has about a two-ton cooling capacity, which might be adequate for a small 1,200 or 1,500 square foot single-family dwelling in some of the outer boroughs, not close into downtown Brooklyn. Clearly Manhattan is not really the market for that. But many parts of the non-bedrock boroughs, which are parts of Staten Island, southern Queens, southern Brooklyn, and the easterly portions of the city, could take advantage of that. And it would be lovely to have, to be able to have, a database where somebody could go in and say, gee, I'd really love to have geothermal for my house, my furnace just kicked the bucket, I want to go out and do that. Financing needs to be there, of

course, because people can say probably afford something like $150, $200 more, maybe it's $300, but their electrical bill comes down $50 or $60 or $70 a month. To make this doable it would be nice to see a finance entity out there which is specifically geared to the smaller project, where the moneys and the loans are geared to a level that can be handled by customers such as this, and also have a term which runs about 50% of compressor life. I think we can put compressor life safely at about 15 years, we know that, it's a bell curve, some of them will fail on day one, some of them will run forever. You've seen the refrigerator in the garage that your grandmother had, so we know that some of these compressor motors run forever. But if a seven and a half year term were imposed on those loans, then you could say, well, the system is paid off after half its lifetime, it's probably going to run, some of the parts will last 20, 25 years, but the compressor probably dies after 15. Now we're looking at a situation where they're doing okay and they can afford this retrofit for seven and a half years, and after that for seven and a half

years they're picking in high cotton, because they're getting all the savings with no loan payments. So that's another suggestion that I would have. One of the … and I think getting back to the well drillers, the most difficult part is to find somebody who can do the loops, and I'm confining my remarks at this point to what we call the loopers, because as we've heard from other people who have already been on the panel, from John and Jack, we have open-type systems, we have standing-column wells, these are systems that are really appropriate for higher-level projects, say institutional, large commercial who have engineers, who have maintenance staff and can deal with the kinds of problems that aggressive or unfavorable groundwaters bring with them, and are able to put in heat exchangers and deal with this in a very professional way, which would allow the infrastructure to exist for many years. 90% of the geothermal systems go in, as Jack stated, are closed-loop, for a very, very good reason. The first reason for me, it's very self-centered, these bore holes are less than 500 feet deep, so we do not need to deal with the New York State

Department of Mineral Resources in the form of Peter Briggs, who says if it's more than 500 feet deep, it's a mine and I get to give you a permit. I don't think we're interested in giving permits on closed-loop or any kind of well, because I'm not sure it's a mineral resource. Again, this speaks to the permitting that John Rhyner mentioned, and we would like to see that simplified and which would allow this technology to get out there a little bit easier. So at this point we have a short list of about eight, if you stretch all the way out to Vermont ten, well drillers, whom we can call to the table when we have generally a commercial project or a very, very large residential project, you know, some mansion, somebody who is very well-to-do. This is not the market I would like to see expand, because that market is already there, its people are sophisticated, they read the papers, they understand the tax advantages, they understand the energy advantages. We would like to reach out to the people that perhaps don't understand it 100%, but being presented with the situation where they are able to purchase this from competent

tradespeople, from competent loopers, they can actually get this done for their buildings. So I would like to see training, perhaps the trades, the unions in the form of guilds, start to have training for closed-loop installers, it's not complicated, there is a lot of technology that's basically off-the-shelf, there are many engineers up in the northern part of the state who also offer installation services. They purchase the tubing, the fittings, from known national suppliers, and it's really an erector set-type of activity, it is not complicated. It's easy to do, and if this clearinghouse were established and we managed a critical mass with the installers outside of the house in the form of loops, which are low-maintenance, you fill them with the water-glycol solution, it's a mixture, you basically have a lifetime, it's very, very, long, I don't know how long the loop … 50 years, says Jack. I believe that we haven't had one fail yet. At the rate I'm going, I'm not going to see one fail, which is very pleasant. On the one hand. And the geothermal equipment is available from Climate Master, a water furnace, a floor-to-heat pump,

Carrier and Trane, major manufacturers, are having the equipment labeled for them, produced by people who have a lot of experience at it, so it's all out there. So my message to you, to the Council, is that it's all available to us, how do we make this available to the people out there who would like it, and at the same time create this infrastructure which is going to allow less energy consumption, less air pollution, it's going to wean us off an energy budget which includes a lot of imported energy, we can reduce that a great deal. We are … even though we are a relatively-cloudy place, we have a lot of photovoltaic available to us, and if we start getting the weatherization programs that are available to us through NYSERDA and the utility programs, with the photovoltaic subsidies and programs already in place, and create a geothermal database that gets us up to critical mass, I think we can do things which will be admirable in the eyes of the world. I think people will look to us as an example.

CHAIRPERSON GENNARO: Thank you, thank you. Wow, that's a lot to absorb. Let me kind of pose some comments or questions and try to

see how well I did here. Hopefully the staff is taking notes of that great body of information that just came my way. With regard to Con Ed, for Mr. Collins, with regard to Con Ed, with the classification of all-electric versus fossil fuel, I missed like why that matters.

MR. COLLINS: That is because if you are heating and cooling your house with electricity as the mode of force, you need to purchase that energy. And if you get the normal EL1, which is what we all have, apartments, houses, all the same, you just get your bill and you look at it, it will say EL1, which is your service classification. And if you do away with all the mumbo jumbo they put in your bill.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: Take the moneys and divide it by the kilowatt hour, you're going to see that you're paying 22 to 24 cents per kilowatt hour, that's what we're all paying, all of us in this room. And if you get the all-electric rate, it's going to be 14 cents, that's almost a 50% reduction.

CHAIRPERSON GENNARO: But what does

that mean? And I'm making a (crosstalk) here.

MR. COLLINS: The all-electric rate would be service classification, I think it's 1B or 1C, something like that.

CHAIRPERSON GENNARO: Which means these are people who use electricity for everything.

MR. COLLINS: Everything. You only have one electric meter, so it comes in.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: Assuming you have photovoltaic, eventually some of it might go out, which would be nice.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: So you're purchasing kilowatt hours to do whatever, run your dishwasher, watch TV, turn the lights on.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: All that sort of stuff, 24 cents per kilowatt hour. The all-electric rate, which is called El, I think it's 1, and then there's a B or a C.

CHAIRPERSON GENNARO: If you look at people who heat and cook with electric.

MR. COLLINS: All electric.

CHAIRPERSON GENNARO: All electric.

MR. COLLINS: That's correct, because there are some houses that are even housing projects that made a sweetheart deal with Con Ed, they said, look, we're going to go all-electric, however, we would like to purchase this at an advantageous rate.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: This is all captured under rates approved by the Public Service Commission. So the place to start is to go to the Public Service Commission and say, look, we're having an initiative. We have a study that shows us that we can save a great deal of energy by going with geothermal technology, but as part of this, we would like to see Con Edison meet us and say, okay, geothermal technology is an electrically-driven system, and it is, it's a compressor just like you have in your refrigerator, just like in a window air conditioner, just like any other compressorized product that you have in your home or in a commercial installation. The difference is,

instead of being coupled to the air, which is at 90 degrees during the summer or higher, it's using the ground, which is at 55 degrees, approximately, which is a much nicer temperature difference for what you want to do.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: And in the wintertime, instead of using say an average … the average winter temperature in New York City is 37 degrees F and rising, you could be looking at using 50, 51, 54, 55 degree water.

CHAIRPERSON GENNARO: Right, but just to play the devil's advocate, I mean, they only … the way they view it is that they want all the power to be purchased from them, but you're saying in a way it is, because there's like electrical stuff that has to run to do the- -

MR. COLLINS: (Interposing) The EL1 is designed for fossil fuel heating, which today means natural gas or oil, number two.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: And geothermal heat pumps simply don't do that, they use electricity to spin a motor. I approached the gentleman from

Con Ed who appeared in opposition at the Public Service hearing and asked them why they were doing it, tears in my eyes. And they said, ah, it's a business decision. So they must be brought to the table, they're going to come kicking and screaming, let me assure you of this. They don't want to hear about this, because they're an ESCO, and their job is to sell electricity at the highest possible rate. But we need to make sure that they can't do that in the instances where it's inappropriate.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: And I believe this- -

CHAIRPERSON GENNARO: (Interposing) And they're going to see it as a guy who wants to heat with geothermal and he also wants to cut his electric bill from Con Ed.

MR. COLLINS: Well, but he's going to be using more electricity, right? He's using gas or oil for heating.

CHAIRPERSON GENNARO: I'm just thinking this through, I'm not- -

MR. COLLINS: (Interposing) No, no, they will be kicking and screaming.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: No question about it.

CHAIRPERSON GENNARO: Okay.

MR. COLLINS: And we had in '96 started out, there was at that time a geothermal rate, which is why Con Ed called us in and presented it to us, that's 1996.

CHAIRPERSON GENNARO: Right.

MR. COLLINS: By the year 2000, I find myself sitting in front of the Public Service Commission- -

CHAIRPERSON GENNARO: (Interposing) Oh, because this was, it was a change to make it.

MR. COLLINS: It was a change, yes, I'm sorry, I didn't explain that.

CHAIRPERSON GENNARO: Okay, so there was a change to make it.

MR. DiENNA: There was a geothermal heat pump rate previously.

CHAIRPERSON GENNARO: Right, right. Jack, just talk into the microphone.

MR. DiENNA: Sorry, and I have to tell you, I am working with the Public Service Commission right now, not only to effect change in

that type of relationship, but they're also looking at it to model or to look into modeling the same action that the PSC of Maryland did, and that is declaring it a renewable resource.

CHAIRPERSON GENNARO: Right. I was going to get to you, I was going to get to you in a minute.

MR. DiENNA: Yeah. That, what Andrew is talking about was a geothermal heat pump rate that mirrored the electric heat rate, and as Andrew said, it was just a change that we're not going to classify that as electric heating any more. I've got a utility background, I was one of the ones that created a geothermal heat pump rate across the board.

CHAIRPERSON GENNARO: Sure, but they're on the record as having done this already.

MR. DiENNA: Yes.

CHAIRPERSON GENNARO: When they were in a different mode, right.

MR. COLLINS: Yes, when they were a power company, their interest was to bring the summer peak demand down, because geothermal has a much lower peak demand than air cooled would.

CHAIRPERSON GENNARO: Okay.

MR. COLLINS: Because of the favorable temperatures that we have in the ground. Once they became an ESCO, their interest waned.

CHAIRPERSON GENNARO: Right, sure. Okay, well that should be easy.

MR. COLLINS: You are the legislature.

CHAIRPERSON GENNARO: What's that?

MR. COLLINS: You are the legislature.

CHAIRPERSON GENNARO: Yes, the local legislature. But there is that history there, so that I think bodes better than had it not been that way. And all the other good testimony that you gave us, Mr. Collins, I … the staff took good notes on that, and … but the fossil fuel thing seems key, you know. So thank you, thank you, I might come back to you, but that was very good to know. And Jack, you don't mind if I call you Jack?

MR. DiENNA: Not a bit.

CHAIRPERSON GENNARO: Okay. Let's talk about two things that you talked about that

jumped out at me were about the accreditations and certifications and standards, and also what Maryland did to make this technology available for REC's, I guess.

MR. DiENNA: Yes.

CHAIRPERSON GENNARO: And to be eligible for the RPS, I guess, money, right?

MR. DiENNA: Yes.

CHAIRPERSON GENNARO: So I'm going to presume that we don't have this now, right?

MR. DiENNA: Well, let me start with the accreditations- -

CHAIRPERSON GENNARO: (Interposing) All right, let's start with that.

MR. DiENNA: Because I do represent the International Ground Source Heat Pump Association that Andrew was talking about. We do have accreditations, there are 238 installers across the State of New York. Unfortunately, they're not here, they're upstate typically. But there is a movement with NYSERDA, in fact I have a meeting with them on Thursday, for commercial buildings to establish a Workforce Development project to where we train installers, loopers,

drillers, that type of scenario, so that we can build a sustainable infrastructure to better support the growth of this technology in New York State. The Public Service Commission is looking at this very, very seriously, about looking at what Maryland did, and classifying this as a thermal asset. I'm going to tell you it's basically because this technology is going to help us more so in space conditioning and cooling, which is when we have our peak demands. Right now in Oklahoma we've done a study that they're experiencing .75 KW reduction per installed ton of capacity. So that's almost one KW per installed ton of capacity reduction in your load. So that's where this would really benefit us, especially in the institutional, or better yet in the light residential, and really- -

CHAIRPERSON GENNARO: (Interposing) Let me ask you one other thing, because when we … with regard to what … oh, you want to talk about the standards before we get to the Maryland thing?

MR. DiENNA: Sure.

CHAIRPERSON GENNARO: Yeah, okay. But I'm kind of jumping around. With regard to

what Maryland did, is there any other state that has done that also? It seems that the Maryland senate passed this.

MR. DiENNA: Yes.

CHAIRPERSON GENNARO: But has it gone through the other house and been passed?

MR. DiENNA: It has, the governor signed it.

CHAIRPERSON GENNARO: The governor signed it, okay.

MR. DiENNA: The governor signed it. There are three other states, and by the way- -

CHAIRPERSON GENNARO: (Interposing) How many other states have gotten on board here?

MR. DiENNA: … I should clarify something. There's more geothermal heat pumps in New Jersey, Pennsylvania, New York and Maryland than anywhere else in the United States. So this is not a new technology for any of us on the East Coast.

CHAIRPERSON GENNARO: These are the states that- -

MR. DiENNA: (Interposing) Have the

most projects installed.

CHAIRPERSON GENNARO: But has that been done by virtue of them being available for renewable energy credits and RPS stuff?

MR. DiENNA: No, it's actually been done done because of NYSERDA in New York, and because of the heavy installation capacity in New Jersey and Pennsylvania. That's really why that's happened. There has been no state initiative and Pennsylvania and New Jersey as of yet. There has been an initiative with NYSERDA from 2000 until the present time. In fact in NYSERDA in 2003, as I said, and I gave that to you, I think we had over 135 installations that we counted then.

CHAIRPERSON GENNARO: Right.

MR. DiENNA: That was 2003, so we've gone on from that point and every two years we hold training classes, and this is Workforce Development, this is in curriculum classes, it's taking people that are already water well drillers, as Andrew said, and taking them into the realm of geothermal drillers and installers.

CHAIRPERSON GENNARO: And how do we get these accreditations, certifications? Would

that be something that the city would do or could do, or the state would do?

MR. DiENNA: The state could … the city could do it, the state could do it, we're usually using a community college to do that, but IGSHPA, the International Ground Source Heat Pump Association, has the accreditations and what we would do is bring in trainers that we already have in state to give accredited classes.

CHAIRPERSON GENNARO: Right. But right now it's the wild, wild west, right? I call myself a so-and-so tomorrow and- -

MR. DiENNA: (Interposing) Actually it's not so much happening that much, but as Andrew said, there are some, you know, anytime you see a movement, everybody becomes an expert.

CHAIRPERSON GENNARO: Right.

MR. DiENNA: But the big part about this technology is that unlike typical HVAC, when you install it, if it's wrong, you can just go in and fix it. We're installing geothermal heat pumps or ground loops that are good for 50 years, so that's great if it's a good job. If it's a bad job, it's a 50-year headache. So that's what

we're trying to prevent. I think that you're going to see that that pipe that I'm talking about in Paul Bony's presentation.

CHAIRPERSON GENNARO: Okay. Yeah, so any kind of brainwaves that you can give us beyond just the short statement that is here, on how this could become part of the bill that we did, or whatever.

MR. DiENNA: I'll send you a redacted- -

CHAIRPERSON GENNARO: (Interposing) Okay, fine. And I'm going to direct the counsel of the Committee to get that from Jack, and is there any movement on the part of the state to make this technology eligible for renewable energy credits, or renewable portfolio standards.

MR. DiENNA: We're in discussions right now and as you can imagine, that is a fairly lengthy period. But up to this point- -

CHAIRPERSON GENNARO: (Interposing) There's certainly nothing stopping me as the Chairman of this Committee from writing them a letter saying that they should do this, or from me as sort of what we do here legislatively on this

issue, we can do a bill locally and we can do what we call a resolution, which in our- -

MR. DiENNA: (Interposing) Absolutely.

CHAIRPERSON GENNARO: Which in our legislative body a resolution is not a bill that becomes law, it's like a statement to some other level of government to do something. There's nothing stopping the City Council from the City of New York from doing a resolution.

MR. DiENNA: Sure.

CHAIRPERSON GENNARO: It would formally call upon the state to make it eligible for renewable energy credits and renewable portfolio standards, whatever.

MR. DiENNA: Absolutely.

CHAIRPERSON GENNARO: Again, it's a bigger deal to get the entire body to do that, because then the calls come in from so on and so forth, and it's not just a letter from me, it's like a statement on behalf of the entire institution that gets voted, yes, it's just a statement, but it's a pretty big deal when we as a body get together and say we're calling upon some

state entity to do this or that.

MR. DiENNA: Absolutely, I think that would be spectacular.

CHAIRPERSON GENNARO: I'm … yeah, I just want to know what to do, and so that would be- -

MR. DiENNA: (Interposing) I can draft … I'll send you things. The main thing, Chairman, that I want to state though, is we keep talking about emissions and energy independence, but if you don't have a job, you really don't care about those things. So basically what I'm saying is, let's get back to the people realm of this.

CHAIRPERSON GENNARO: You sound like something I would say.

MR. DiENNA: Put people to work.

CHAIRPERSON GENNARO: When I'm out on the hustings doing my thing.

MR. DiENNA: Yeah, we'd put people to work, and if … and like I said in my statement, 90% of this is green collar, it's people that have been put out of work, whether they were factory workers or whatever. And if we have a large initiative in New York, we're going to see, I

don't know if you knew this, but we used to have a geothermal heat pump manufacturer right here in New York State. I'm sure if this becomes that much bigger, that you will see our manufacturing folks think about putting factories back in New York State, and that's primarily what I promote, it's great that we have energy independence and security or emissions, but if I don't have a job, all that stuff goes by the wayside.

CHAIRPERSON GENNARO: Right.

MR. DiENNA: So that's primarily where we're looking at. And 90% of the people that are in this room that are in our industry are all of one voice. In fact, not 90%, 100%.

CHAIRPERSON GENNARO: Okay. Let me just … thank you, thank you, Jack, and I made some notes on … yeah, I made some notes on John, so is that my copy? Is that … yeah, here you go. And John, I'll call you John, you don't mind.

MR. RHYNER: That's fine.

CHAIRPERSON GENNARO: With regard to the study, Columbia and EDC and all that, that's available to us? Or where do we get that? Is that some kind of proprietary thing or

something?

MR. RHYNER: I sent one of the studies already, but the one I referenced was more a Power Point presentation, which the students gave to EDC and me together.

CHAIRPERSON GENNARO: I was talking about like the block-by-block thing.

MR. RHYNER: Yeah.

CHAIRPERSON GENNARO: That one?

MR. RHYNER: That was … it's not a published, bound study, it was end results were a presentation that they made to myself and EDC. EDC was their hypothetical client.

CHAIRPERSON GENNARO: Right.

MR. RHYNER: So I never … I do have the presentation, I would talk to them.

CHAIRPERSON GENNARO: Yeah, well, I'm just thinking that we're- -

MR. RHYNER: (Interposing) With EDC it's- -

CHAIRPERSON GENNARO: (Interposing) That if we're running around and telling the city that they should do some kind of a study, but I think whatever- -

MR. RHYNER: (Interposing) If it's something that's already been done, that you could benefit from.

CHAIRPERSON GENNARO: It's already been presented to EDC.

MR. RHYNER: To the committee.

CHAIRPERSON GENNARO: Which is the city pretty much, it's like a non-profit, it's a government corporation, which is very much part of the city.

MR. RHYNER: I think I would want to consult more with the Columbia grad students, because they're … as a matter of fact, their illustration in that has a copyright of the students.

CHAIRPERSON GENNARO: Yes, I see that, okay, well certainly we've been made aware of it, and this will inform our discussions with the administration and- -

MR. RHYNER: (Interposing) Would you like me to reach out to Columbia? I can do that. I know the mechanical engineering department professor is still there, the students have moved on.

CHAIRPERSON GENNARO: Right.

MR. RHYNER: But I'm still … it's up to you.

CHAIRPERSON GENNARO: We're kind of compiling all of the information that we can get on that, so why don't I ask Samara to talk to John about whether that's possible for us to get our hands on that. You guys have been tremendous, I have to move on to the next panel, but it's really a tremendous volume of information that you guys have brought forward, I really appreciate your willingness to be here and to … and you must think I'm pretty smart to be able to actually assimilate everything you told me during the time of this panel, and I think I've got to put a jump drive in my ear or something to kind of like store this. But you guys have been terrific, we really appreciate what you've brought forward, and what you guys are doing for the industry, and I think we're really on to something here, and thank you for your presentation.

MR. DiENNA: Thank you.

MR. RHYNER: Our pleasure. The next panel, which I previously called.

MS. SWANSTON: You have those three.

CHAIRPERSON GENNARO: Do I have it? I'm not … okay. Okay, yes, these are the people who … Mr. Rick Bostian and Paul Bony, I'm not sure.

MR. BONY: Bony.

CHAIRPERSON GENNARO: Bony, okay. Yep, okay.

MR. BOSTIAN: Can I sit up here?

CHAIRPERSON GENNARO: Yeah, because I figure, you know, if P-O-N-Y is pony, then- -

MR. BONY: Then B-O-N-Y must be Bony.

CHAIRPERSON GENNARO: Right, right.

MR. BONY: You got it.

MS. SWANSTON: Water Furnace?

MR. BOSTIAN: His is on the screen. Will mine be on the screen? If not just leave me a copy.

CHAIRPERSON GENNARO: And I'll tell you what, I have to step out for 60 seconds, I'll come back, in the meantime you can get set up with the presentation, have the statements in front of

me, and the counsel can swear in the panel, and I'll be back in just one minute.

MS. SWANSTON: He goes through it.

MR. BONY: Do you have a thumb drive we can …

MS. SWANSTON: Excuse me.

CHAIRPERSON GENNARO: I got kind of a recommendation, so one of the witnesses has a presentation, or both Rick and Paul are dependent upon the presentation? On the audiovisual thing, right? Okay. Okay, while we're fixing it, do we want to let Terry go, just while we're doing it? And I take it that the panel is duly sworn, right?

MS. SWANSTON: No, they didn't get sworn yet.

CHAIRPERSON GENNARO: Okay.

MS. SWANSTON: Gentlemen, would you please raise your right hands? Do you swear or affirm to tell the truth, the whole truth, and nothing but the truth today?

MR. BOSTIAN: I do.

CHAIRPERSON GENNARO: Okay. And I'll tell you what, Terry, can you be the last one to testify on this panel? Is that okay for your

time thing? Will that work for you? What's that?

MR. O'BRIEN: By 4:00 I'm a pumpkin.

CHAIRPERSON GENNARO: Okay, great. That should be fine. Okay, I guess we'll start with Paul, right, we'll start with Paul, and … right, and I'll note for the record that Mr. Bony and Mr. Bostian came from Oklahoma to be here, although I see Indiana also.

MR. BONY: And Colorado, so we came from everywhere.

CHAIRPERSON GENNARO: Okay. Great, so and your statement is this one, right, Paul?

MR. BONY: It looks like it, yes.

CHAIRPERSON GENNARO: Okay, great, okay, why don't we start with you?

MR. BONY: All right, well, good afternoon, Chairman Gennaro and distinguished members of the City Council. It truly is an honor and a pleasure to be here this afternoon to offer support for your efforts to explore measures that will facilitate and increase the use of geothermal energy sources in New York City. I am Paul Bony and I have over 25 years of experience focused on

energy efficiency, renewable energy and electric utility peak demand management, and I am the Market Development Director for ClimateMaster, we're an Oklahoma-based manufacturer of geothermal heat pumps, with over a 1,000 dealers and distributors across the United States. Based on my experience, this pending legislation will provide many benefits to the citizens of New York City. The legislation will definitely save energy. As you've heard, buildings use nearly 40% of all U.S. primary energy, with heating, cooling and water heating accounting for nearly ½ of that use. Geothermal heat pumps can reduce the energy consumption of buildings by up to 50%. This legislation will save consumers money. Families and businesses can benefit greatly from energy efficiency upgrades, including geothermal heat pumps, that provide energy bill reductions. With the high cost of heating fuels and electricity in New York City, ground source heat pumps combined with building efficiency upgrades should easily allow families and businesses to reduce their annual energy use by 50% or more. This legislation will create jobs, the installation of

efficient ground source heat pumps will generate employment for local labor. The installation of geothermal equipment and ground loops has to be done locally, it is impossible to import a ground loop from offshore. Based on my experience as a geothermal contractor, a business installing 50 to 70 residential geothermal heat pump systems annually would employ seven full-time people in good-paying jobs. This would not include the employment by other subcontractors needed to provide related services, including energy audits, drilling the ground loops, electrical work, carpentry and weatherization upgrades. With over three million housing units, the replacement of fossil fuel heating systems with ground source technology will be able to generate construction employment in New York City for many years to come. This legislation will reduce the city's carbon footprint and summer peak electric demand. Geothermal heat pumps provide significant peak load reduction and improved electric system load factor. This allows the electric utility to provide energy efficiency to the rate payers and reduce the need for expensive new generation

without putting pressure on electric rates. These energy savings also provide approximately ten metric tons of annual carbon savings per home per year. In conclusion, ClimateMaster is very supportive of this legislation, I am convinced that it will provide great benefits to the millions of citizens of New York City, and will serve as a leadership example to city governments across the United States. Thank you for giving me the opportunity to share these brief comments with you this afternoon, and I've been asked to close my testimony with a short presentation on the basic operation of ground source heat pump systems. So we will start with that. So what is a ground source heat pump, also known as a geo-exchange system, a GX system, a geothermal or a ground-coupled heat pump system, and why should policy makers care about them? Well, as you've heard several times this afternoon, it's because that's where the energy gets used, and I should say, that's where the energy gets wasted. So, buildings are the primary contributor of carbon emissions in our economy, more so than transportation. So 39% of our primary energy goes

into buildings, and 20% of that goes to heating, cooling and the production of domestic hot water. If we can do that efficiently and with renewable energy, we can make a significant dent in the nation's carbon footprint. So a traditional fossil fuel system, which would be a furnace or a boiler, by theory can only be 100% efficient, if you could use all of the heat when you combust the fuel, plus those systems need electricity to move the energy. So at the end of the day, depending on age and tune-ups and how well the system was designed, only 70% to maybe 95%, and I think that's a stretch, of the energy consumed by a fossil fuel system actually makes it into the use of the conditioned space. The rest of what you would call stack emissions, so that's where the carbon dioxide comes out, if the hydrocarbons are unburned, that's where you get smog, and if you burn oil in particular, you get the small particulate matter, which causes its own health concerns. So you eliminate the combustion, you can eliminate those three emissions. Ground source heat pumps don't burn energy, they actually move energy from the ground into the space, and

from the space into the ground. So the folks who study carbon emissions, when they said how can we get the biggest impact in reducing the carbon footprint, basically said, let's do the two things at the bottom of the chart, let's have increased electric efficiency measures, and let's have increased fossil fuel efficiency measures. That's exactly what ground source heat pumps do. In the winter they create efficiency for space heating, in the summer they create efficiency for space cooling. Those two measures alone can account for 65% of the carbon savings goal outlined in this chart. So how does that work? Basically we sit on a giant solar thermal battery. So the sun comes up, it charges the earth, the earth stays at a relative temperature, and if we can tap that deeper temperature, then we can trick our buildings into thinking they live underground. So if we got in the elevator today and we went 30 stories underground instead of aboveground, we'd be at a nice 60 degree environment and it wouldn't be very hard to heat and cool our buildings if it was 60 degrees outside year-round. So that goes to this leverage, a little bit of electricity to

run a fan, a compressor and a pump can move three to five thermal energy units out of the ground, and ground source heat pumps can deliver that energy with a total system efficiency, a round-trip efficiency, of 400% to 600%. So one unit in, four to six units of energy out, and that's at the source, not upstream, where you actually have to generate the electricity or make the natural gas. So that's at the building site. So again, just a schematic of how that works, the building outside may see 10 degrees in the wintertime, but 100 feet underground thinks it's 55 or 60. So the building, you trick the building into thinking it's operating in a steady-state 60 degree temperature in the winter, the same applies in the summer, it may be 100 degrees outside, but the building's heating and cooling and water heating system thinks it's 60 degree. So basically we could move New York City to Hawaii, right, if all the buildings thought it was 60 degrees all the time. And it would be much less expensive to do it this way. So how do we do that? I actually brought some show-and-tells. GSA always gets on me when I bring this up, so I want you to know I

don't do this very often. But where's my rodeo ID, okay, thank you. So that little piece of plastic is the bottom end of what a loop would look like in the ground, water with an anti-freeze solution would circulate through that pipe, and it can go down to whatever depth the engineers calculate to the pipe strength and the soil conditions. And that's where that heat exchange occurs, so that the water in that pipe, after it makes a long enough trip in the ground, thinks it's at 60 degrees. And then it comes back into the building where a compressor does its magic and works with that 60 degree ground temperature. So a ground source heat pump is like every other heat pump that we experience every day, our refrigerators are heat pumps, they take the heat out of the food and actually make the food cold on the inside. That's why when you're standing in front of the fridge, your head is cold and your feet are warm, because the heat is coming out of the food and into the space. All these window shakers that you folks have here in New York City are basically trying to take cold out of the air and put it into the building and reject heat

outside. So basically a ground source heat pump in its essence is a compressor technology that uses a refrigerant gas to move energy, and in the ground source heat pump case it can make heating and cooling and hot water at the same time. So all the magic happens, and this is the one that always gets me busted at the TSA line, you can tell by its construction that it kind of looks- -

CHAIRPERSON GENNARO: (Interposing) Oh, you know what, we have to give things to the sergeant, and the sergeant gives them to me, that's the protocol we have.

MR. BONY: There you go.

CHAIRPERSON GENNARO: Okay.

MR. BONY: I don't want to violate the protocol. That is a cutout of what we call a coaxial heat exchanger. So refrigerant gas- -

CHAIRPERSON GENNARO: (Interposing) You get on a plane with this?

MR. BONY: Well, you know, it took an hour, but I did … but I have two more major airports, and that was the hometown team that let me get into the system, I don't know if I'll get home this week or not. But I may leave that with

you just to guarantee my safe arrival. But that's a coaxial heat exchanger, so basically that's where the water interacts and the ground loop interacts with the refrigerant in the refrigerant cycle and the heat exchange occurs there. So in the summertime, hot refrigerant gas that's taken the heat of your building reacts with 60 degree water inside that shell, heats the water up, it goes back into the ground and over a series of many feet of pipe, transfers that heat into the soil. In the winter, the exact opposite happens, now it's cold outside, your building needs heat. Well, the refrigerant gas picks that heat up from the water, uses a compressor to lever it to a high temperature and put it in your building. So it's a very simple concept, water is a great heat exchange medium, the earth is a very stable source of heat, and those two technologies, that plastic pipe and that metal coaxial heat exchanger, combine with a compressor and some pumps are how we move the energy around. So if you do that, you can take 50% of the building's thermal loads and take it off of fossil fuels and turn it into renewable earth energy. So you shrink the thermal

footprint of the building by 50% by coupling it to the earth. So you still have the same end uses of heating, cooling and hot water, but you just take a big portion of that and put it in the ground or take it from the ground instead of burning a fossil fuel to get there. So if you're not burning fossil fuels, you're saving carbon, and the basic formula of a fossil fuel is CH, from CH4 for natural gas, you combust that and you get CO2, H2O, sometimes you get CO and it kills you. So you don't have to worry about that, and then 300,000 ground source heat pumps replacing oil or gas boilers could save the emissions of a 500-megawatt coal plant, which is big enough to serve 300,000 to 500,000 homes. So basically we have some utilities that are actually using the offsets, or want to use the offsets, from ground source heat pumps to keep their imbedded coal plants by basically, we won't generate the carbon over here so we can generate low-cost electricity over here. And I'll mention one of those utilities in a few minutes. So way back in 1993, the U.S. Environmental Protection Agency did a study and basically said ground source heat pumps

produce the lowest carbon dioxide emissions, including all source effects of all available space conditioning technologies, and that hasn't changed today. The other thing, and this is some studies I did as a utility person, I was really curious on, but a ground source heat pump will save more CO2 than an equivalent investment in solar photovoltaics. Now I did that study in Colorado where the sun shines 250 days a year and we were a heavily coal-based utility system, but my hunch is that would hold in New York as well. You have less sunshine but your grid probably isn't as coal-based as we were in Colorado. So Oakridge National Lab, you heard about this report earlier today, I think Jack mentioned it, did a study to kind of look at ground source heat pumps across the nation, and they came to the conclusion that ground source heat pumps would reduce the purchased energy consumed for heating, cooling and domestic hot water, and if we applied that nationally, there's that 45% number again. They then for the first time looked at peak energy demands, so that's summertime when it gets really hot in the city and you go out on load control,

and again you heard the numbers mentioned, but it could cut your system peak by 56% from air conditioning peaks in the summer, by the reduction Jack mentioned of 500 to 700 watts per installed ton of capacity, which is huge, again, because the air conditioners operate in a 60 degree environment, not in a 100 degree environment. Depending on rates, and actually because of your high electric bills and your high cost of fuel oil, this number is low for New York, but reduce consumer bills by up to 48%, and I'll show some local math for you here in just a second. And again, reduce carbon emissions for that building by up to 45%. So here's just a brief schematic of everything we discussed. So the ground loop couples the refrigeration system to the earth, in heating mode basically you move low-temperature heat from the ground and step it up with the compressor and put it in the conditioned space, using a compressor and a fan system, and in air conditioning you do the exact opposite, you take the heat out of the air and you put it in the ground where it's actually stored, and you can use it again when the winter rolls around. So a very

simple mechanical system that relies on refrigeration technology and the ground coupled loop and some pumps to circulate so there's an interface between the two. So not much to the system, there's actually the unit, we call it, or the ground source heat pump, which can be a self-contained forced air unit, inducted applications. From what I've seen in my experience in the city, you're more boiler-based, so we make units that make hot water, and then you can use that hot water for space heating and chill it in the summer for cooling. You need some kind of a pump to move the water between the units and the loop field, you need a thermostat to control the temperature. So very simple components, and a package residential ground source heat pump unit on a forced air system looks just like a furnace. The only difference is there's no gas pipe or oil pipe to come into the unit, there's two water connections and an electric connection. Our industry makes units for every configuration from large commercial rooftops to little wall units that could sit on an inside wall and like you would see in a hotel room, so upflows and

downflows, you can hide them in the ceiling. So basically if you can envision it, there's a piece of equipment that can fit the space to move the energy. Just two of my favorite examples here, in Oklahoma City our company worked really closely with Habitat for Humanity. They drill a 400-foot loop and then they build their houses around it. So basically the loop goes in first and it goes right under what will be the furnace and then they build their homes around that 400-foot loop, and then you can see modern condominiums, in this case in Washington, D.C. But not to leave New York out, you've heard about the State of Liberty gift shop is a geothermal retrofit, and these are samples of both new and retrofit applications across the country. The Denver project in the lower right is actually a Housing Authority project in downtown Denver. So new buildings, old buildings, we've put geothermal heat pumps in all of them as an industry, including the entire state capitol in Oklahoma City and soon the state capitol in Denver. So there's the basics, you need to put a hole in the ground, you need to fill it up with pipe, and then you need to close the

hole up so it's not a hole any more, and then you connect that pipe and get it into the building, and you hook it up to a heat pump. So the technology is very simple, the challenge is in the application, but that hasn't changed in the 20-some years I've been doing geothermal heat pumps. And you can see again that's pretty much all local labor, almost neighborhood labor, when you get to scale. So this is a picture, just if you imagine, if we started drilling at the end of your desk here and went to the far end, and that linear space that could be all the ground you needed for a six-ton or more residential application in a line, or you could move it around into a square. So you're not talking a lot of space, but you do need to have some place to put those loops in. I happened to notice coming out of the desert southwest that you guys are surrounded by water, so if you have water you can use a different kind of a loop, in this case these are plate heat exchangers, where the loop pipe actually circulates inside those plates, and the energy transfer occurs in the body of water. So you could put those under piers, anywhere you're

moving water, and I understand you pump a lot of water in New York just to keep it from not going where you don't want it. You're actually pumping energy, you just need to put a heat exchanger like that to capture the energy as the water goes by, and you can use that to heat and cool the space right where you're pumping your water. So you could actually recover your pumping bills to transfer that into a heat exchange, or an energy exchange. This is an example I did just for a small home in New York City, 1,800 square feet, with older equipment, with oil heat, versus a ground source heat pump, and it's been a long time since I've been in a house with oil heat, and I didn't realize how expensive it had gotten. So this math came up with a $3,000 annual savings in electric and oil bills for that 1,800 square foot house. So there's a lot of money on the table for your residential consumers if they convert from oil to ground source heat pumps. So in kind of conclusion here, ground source heat pumps are market-proven technology, they do cut total heating and cooling bills, they tap renewable solar energy from the earth, they have a low power

requirement that can provide zero carbon heating and cooling if you hook them up with zero carbon electricity, and they can provide, I think, in New York with some simple financing that we can talk about a positive cash flow, either with creative loop financing or even conventional mortgage financing. And there's … this number is rapidly approaching two million ground source heat pumps have been installed in North America and Canada. There are countries in Europe, Sweden, for example, 90% of all their buildings are going ground source heat pumps now. The Brits have a million geothermal heat pump initiative, where they're actually transferring their country from … that as the North Sea gas dries up, they want to convert to ground source heat pumps, because they don't want to import gas from Russia, or maybe from Pennsylvania, depending on where the terminals are. I give you this chart just so you can kind of maybe take a decimal point off the number, but the DOE looked at a million ground source heat pumps annually by 2017, and what would that do for the country. So if you wanted to have sort of a challenge, what if you did a 100,000

ground source heat pumps annually in New York City, you see you just have to slip the digits by a decimal, but that would be 3.3 million installations across the country, 26 million metric tons of annual carbon reduction, 520 million metric tons of life-cycle carbon reduction over 20 years, and 100,000 jobs. And then this is my back-of-the-envelope math from when I was a contractor of where I thought the labor went. So somebody has to be the estimator or the salesman or whatever word you want to use, so that takes some time. And you should always repair the building when you're there, to minimize the footprint, so that takes some time to do some repair. Somebody has got to do the loop locates and the utility locates before the loop can get drilled. You have to put the loops in, you have to tie it in and restore the landscaping, it takes a few man-hours to set the equipment, somebody has got to run the office. So I came up with a conservative estimate of five jobs per 100 homes, and again, the industry number is somewhere between seven and ten. The good news is right now the Federal government is willing to be your

partner in this initiative, so Federal tax credits cover one third of the cost of a residential geothermal installation, new or retrofit. And on the commercial side, the tax credits are even better. There's a 10% Federal tax cut for geothermal heat pumps, plus there's a five year accelerated depreciation for a system that could last 25 years or more, more for the loops and at least that for the equipment. And then there's some other tax credits if you meet square footage efficiencies that can go up to $1.50 a square foot if you meet the energy guideline. So we see commercial projects where just the tax code provides over half the retrofit cost of a building. And then I throw this out, I'm going to be in Seattle next week with a utility, I'll share that, it's Wyandotte Municipal Services. There's some utilities that are beginning to look at this, and I offer this because the city is a utility, with your water department, but really the ground source heat pump loop kind of looks like a utility plant, in other words it has a very long asset life, the pipe manufacturer warranty is 50 years. We were touring City Hall earlier today and if

they had had that pipe 200 years ago, I assume it would still be working, because it really can't go anywhere, it's an inert material. So what if you treat that loop like a utility plant? So Edison invented the electric industry so he could sell light bulbs, so maybe we need to invent the geothermal utility so that we can sell energy efficiency and carbon reductions, and we've done that, as you can see the different examples there, where cities have become utility providers so they can provide services to the citizens. So in the utility loop concept, the utility, whether it's an electric utility or the water-sewer utility or the gas utility, and I have all flavors of those that are looking at this business, they basically own the loop, they contract for its construction, they finance it over the long term, they collect it on a monthly payment, and basically the customer gets a good quality install, they get a nice fair price, and they get the energy efficiency that they otherwise wouldn't have to write a check for, and it becomes a utility service. So next week Wyandotte, Michigan is going to be recognized by the American Public Power Association for their

innovative loop concept, where they as a municipal utility, and they started serving electricity shortly after it came out of Niagara Falls to New York City, and there's the reasons why they went there. Basically it helped their utility, it levelized their rates, and it met their environmental goals. And they're actually using those loops as part of their urban renewal effort, where they're taking houses that have been abandoned, if they can't restore them they'll tear down two, they'll combine the lots, they'll build a brand-new super-efficient home, and then they provide the loop service, so the people that move into them can afford their utility bills. So ground source heat pumps, you've heard they offer immediate, maybe a well-worn phrase, but shovel-ready projects, they create local, almost neighborhood, green jobs. New York would be positioned to be a national leader if you adopted this platform, it could provide a new income source for the city if you decide to get into the loop business, or investigate that. It will definitely reduce the city's carbon footprint, it will reduce summer peak loads on your electric

generators, it will conserve fuel oil and natural gas, it will reduce businesses' and homeowners' utility costs significantly, given your high cost of energy, and it will result in improved air quality. So kind of the final take-aways here, the ground source heat pumps are the most efficient and cost-effective method of heating and cooling a building, they are both renewable energy and energy efficiency, sometimes that's our problem, people want to pigeonhole us in one camp or the other, and we're really both. They reduce utility peaks and improve load factor, which keeps pressure off future rates, and after 40-some years and a million-plus installations, I can assure you properly-designed and installed they do work. Just some resources in the back there, and then that case study I showed you is actually in my … attached to my testimony as well, so you'll have these websites, and with that when you're ready I'd be delighted to take your questions.

CHAIRPERSON GENNARO: Thank you. Thank you, Mr. Bony, I really, really appreciate the presentation, we'll just do questions and comments for the panel once the panel is done.

And the hour is getting late, so I have to move forward, but that was really a terrific presentation, and particularly the utility concept that struck me. Mr. Bostian.

MR. O'BRIEN: We're going to switch around, Mr. Chairman.

CHAIRPERSON GENNARO: Okay.

MR. O'BRIEN: He's going to set up while I go.

CHAIRPERSON GENNARO: Oh.

MR. O'BRIEN: He has to set up anyway, so it's perfect.

CHAIRPERSON GENNARO: Oh, fine, fine, sure. Terence, yes, of course.

MR. O'BRIEN: I was the draw at the last of the day, but I'm also the briefest, so it's okay.

CHAIRPERSON GENNARO: Right, okay.

MR. O'BRIEN: Also I have some answers to previous panels who had some questions.

CHAIRPERSON GENNARO: Okay, do that.

MR. O'BRIEN: Earlier with New York.

CHAIRPERSON GENNARO: Sure.

MR. O'BRIEN: So I'll go ahead. Good afternoon, Mr. Chairman, almost good evening, my name is Terence O'Brien, I'm the Deputy Director of the Plumbing Foundation of New York City. We are a clearinghouse and educational forum for the entire plumbing industry. The Plumbing Foundation is a non-profit association of contracting firms both union and non-union, engineering associations, manufacturers and suppliers whose mission it is to insure the public safety and health through the enactment and enforcement of safe plumbing codes. I'm here to testify in support of Intro 694, which will establish a study in the benefits of the use of geothermal technologies. Hopefully this study will foster the use of geothermal technology for heating, cooling and hot water in many buildings in New York City thereby making the city more green. Since its establishment in 1986 the Foundation has worked diligently to insure the plumbing industry has as little a carbon footprint on New York as possible. The plumbing industry historically utilizes environmentally-friendly

materials and technology, geothermal and solar technologies, which we've mentioned much today, for heating, cooling and hot water are the next wave of innovation that will help the plumbing industry lessen the city's carbon footprint. Licensed master plumbers have the training skills to insure that these new technologies are installed properly, while at the same time guaranteeing safety and making the city more green. Any technology that can lead to less energy usage and water consumption for heating, cooling or to generate hot water is fully supported by the Foundation. Before you go to his presentation, there are a couple of comments made briefly before, a question by Council Member Lander, who is no longer here, about green projects in New York City and where we are at to get there and a long time, there have been many initiatives by you, by Council Member Dilan and the Housing and Buildings Committee and the Mayor, of course, that we have seen slowly come to fruition, mostly because not everyone understands this, it's a lot of time-consuming things, cost analysis, a lot of things that outweigh each

other. Hopefully the benchmarking will be just the first step, but you're right, there hasn't been, to answer his question, there hasn't been a lot of movement in solar, wind, geothermal, not because of initiatives here, but it takes a long time, I'll speak for the industry and construction in general, they are not always up to speed to doing these things, we're a slow-moving process but we're getting there, and hopefully they will go forward. Back to, I think it was Jack in the last panel's question, about competent groups. There is a component of doing work in New York City when dealing with hot water compared to other places, even in the state, there is a license component. When you do these kind of hook-ups, you have to be licensed by a municipality, by New York City, so a competent group aspect of getting, he said it's kind of wild west out there, is the wild west, but once everyone realizes you have to use competent people, licensed people, in New York City, that wild west component is kind of pushed aside. So hopefully, like I said, we are kind of a clearinghouse if people want to talk to, we speak for all 1,300 licensed master plumbers in

New York City, so we are the people who will actually have to do this in some way, shape or form. So hopefully this is the start of many things to come.

CHAIRPERSON GENNARO: Thank you. Thank you, Terence, and I know you had to … I know that you have to go, but with regard to standards and licenture and certification, these are certainly issues that I would talk to you and the Foundation about before I was to do anything. So you would be my first stop on that train. And so we really appreciate you being here and I mean everyone knows and greatly respects the work of the Plumbing Foundation and I guess it's so critical on so many things before this Committee. I think you've testified, I think the Foundation has testified to my Committee more times than any other entity. I think the Housing and Buildings Committee is jealous, but- -

MR. O'BRIEN: (Interposing) We're getting there.

CHAIRPERSON GENNARO: Okay.

MR. O'BRIEN: We're getting close.

CHAIRPERSON GENNARO: Okay.

MR. O'BRIEN: Thank you, Mr. Chairman.

CHAIRPERSON GENNARO: Thank you, Terence, and give my best to Stuart.

MR. O'BRIEN: I'll take that back.

CHAIRPERSON GENNARO: Yeah, okay. Mr. Bostian.

MR. BOSTIAN: Yes sir.

CHAIRPERSON GENNARO: Please state your name for the record and proceed with your good testimony.

MR. BOSTIAN: My name is Rick Bostian, I'm with WaterFurnace, an Indiana company. I want to say first of all that I'm impressed with the testimony I've heard so far, it's covered just about everything. My primary comments originally on the initiative was that it needed to be expanded. I like the term geo exchange versus geothermal, and one other point, in addition to the ones that have been made, the whole building doesn't need to be geothermal. The advantage of geothermal is that it operates really, really efficiently at part load, and I'm going to skip through some of my slides to show

you that.

CHAIRPERSON GENNARO: Okay.

MR. BOSTIAN: That's our factory that was up there. It is the highest geothermal square foot building, because we make them as well as heat and cool with it. But owners of buildings, they want to know what is it going to cost, and our goal is manufacturers and people that work in this infrastructure, is what's your budget and how much can we take advantage of it. And my point is, the system itself in the building, the units, what they do first is they net the loads inside the building. When he talked about the units in heating or the units in cooling, those individual units can be in heating and cooling inside the building. That creates first a net energy profile for the building itself. Then we go to geothermal. My first geothermal job was done in 1973, it was a school. It wasn't called geothermal, it wasn't called geo exchange, it was just called a smart thing to do. It happened to be near a big dam, they were pumping water through a well, through a heat exchanger. After the building netted all the

loads together, then the extra heat or the extra cooling came from the geothermal, and that's important. If … today we see more and more people doing what we call hybrids, they're doing geo exchange what they can afford, and then cooling towers and boilers are relatively inexpensive, they use those to offset other things. So it's a low-cost loop. In the 50's we knew we could air condition with water better than the air, that wasn't any big deal. In the 60's we started doing closed loops in buildings just for the heat transfer, and then in the 70's EER's and efficiency started getting more and more important and in the 80's really was when schools and office buildings really exploded with water source heat pumps. That was also when, as I've amended the definition of a ground source heat pump to an extended range unit. What that means is now in the early days, as long as the temperatures were between 60 and 90, a unit could heat or cool. It didn't matter if it was 90, it didn't matter if it was 60. Now we've expanded that to water, to basically a brine solution that's basically freezing, up to 110 degrees, and the unit can

still heat it with limits, but that allows -- and what I would ask the Council to do is instead of saying we need to map where it's feasible, we need to look at what alternates are feasible, and release the design community to have more input as to, can we use that water that you're pumping, can we use that river? I used to tell people, almost every city has got a river running through it. If the agency, Corps of Engineers, whoever it would be, would go through that and say, you know, we can allow the water in this river to change one or two degrees, five degrees, ten degrees, and instead of looking at it as, if we use it as a source for heating and cooling, will it change it, ask the Corps of Engineers, how many tons of air conditioning would we have to … or how many tons of horsepower would we have to use to effectively change the temperature of that river. It's a different thought process. Where it happened to me is I'm in Washington State, here's a river, the guy wants to use the river to heat and cool his house. And the Wildlife Department said, no you can't do that. I reverse it on them and I said, okay, tell me, if I brought you a machine that was

this big, and I told you I had just invented a machine that would raise the temperature of that river one degree all year round, you'd laugh at me. You wouldn't buy my $1,000 unit that I was going to raise the temperature of that river. So the fact that you're doing open wells, the fact that you're experienced with standing column wells, it is the infrastructure, it is the people, and how do I get it done. Let me show you something really quickly, this analysis here we'll skip. This is available online, this is ASHRAE's headquarters in Atlanta, it happens to have ClimateMaster units in it. It's being compared to what you hear a lot of press about, with companies that have a lot more money than we do, but variable refrigerant. Those two charts, that first chart is the peak demand. Now when you look at it on the left, that's the ground source heat pump system, and when you look at it on the right, that's the variable refrigerant system. The purpose of the red line across the top, that's the top line on the chart on the left. The green dash line that goes across where your … generally where your peaks are, you can see that whole chart fits

below variable refrigerant. In actual energy consumption, it's a similar comparison. That top line of that chart that covers geothermal is the red line on the right hand chart, and that green line goes through it is down below. The importance of that is not necessarily that it's more efficient than a very efficient system, it's that the difference is not only attributable to geothermal, it's attributable to the fact that it is a net energy system inside the building. And now because we make water to water units and rooftop units and everything, if the engineering community decides they want fan coils or air handlers or whatever that makes more sense, we can still use the geothermal units to create the hot water and the cold water. Or, I have another job in this city which is the NASDAQ sign. The NASDAQ sign is heated and cooled with geothermal units, but they're not applied to a geothermal system, they're applied to the condenser water system in the building, because that sign can't use enough heat to reject it. But in the city a lot of units are cooling-only units, and they have to have economizer coils on them, which make them more

expensive and they use fan energy and everything else. If those units were actually standard range heat pump units, and you could take heat out of that loop by providing heat in the space, that would make more sense. So it's … my message is, just expand it, not so much to the zones where it would work, but application of that extended range piece of equipment. Thank you.

CHAIRPERSON GENNARO: Well, let me … so wait, so with regard to what we're doing, Mr. Bostian, any kind of brainwaves that you might want to send us regarding the actual legislative initiative that we would like to do.

MR. BOSTIAN: I gave it to Samara already.

CHAIRPERSON GENNARO: Yeah, okay, that would be really great. I'm just trying to navigate here, and try to assimilate a lot of information in a short time, I feel like I'm back in school again. And I really, really appreciate you coming all the way to give us the benefit of what you're doing, and it's different than what most people before today and I really appreciate it.

MR. BOSTIAN: Thank you. I had the advantage of listening to everyone else, it gave me the basis.

CHAIRPERSON GENNARO: Yeah, okay. Good, yes, it's … and Mr. Bony, with regard to the geothermal utility concept, to the extent that you can give my staff everything they need to kind of wrap their head around that, that would be … you can get that to Samara as well. And your presentation is going to … because I have it all here, it's going to make it easy for me to not only have a better understanding of what this is about, but to help me make my case once I get into the trenches with all the other competing things that the Council is trying to do. I can say, I've got a better idea than you have, and I have charts and everything else. And so I don't think they're going to have charts and all this, so take that, other Committees, you know what I mean.

MR. BONY: There you go.

CHAIRPERSON GENNARO: You know what I mean? But I really appreciate this comprehensive presentation that you've made, and it's my hope that everyone's time is well-spent

today, because I really want to do something here and I think I made that apparent when I was talking to the administration, right, I think I made that point. They're great people, they're doing a lot, they're great people, but … and I tell you, I'm … most times you poke them and like you get something, you know what I mean. They're not going to say, hey, like you poked me, I'm not going to do anything now. You poke them and then like, yeah, we'll do that. And so gentlemen, thank you, I appreciate it. But the hour is late, I've got to get to my last panel and then I've got to get to work on this.

MR. BONY: There you go, well, thank you for your time today.

CHAIRPERSON GENNARO: Oh, sure thing. Okay, James McKean and Rick Bell, Rick Bell from the American Institute of Architects, and James McKean, Mountain Air Conditioning. Oh, Hicksville, New York, wow, right by the IKEA, right? Jack, my pleasure, sure. Gentlemen, thank you so much. You've waited so patiently to testify, and we're going to have like the final panel privilege of suspending the swearing-in

ritual, because I'm very eager to hear what you have to say, and I'm sorry that you had to wait so long to say it, and I'm grateful to you for being around this long to give us the benefit of your good views. And why don't I start with Mr. McKean, do we have a statement? Okay.

MR. McKEAN: Good afternoon, I'm James McKean, owner of Mountain Air Conditioning & Heating Corp. I started my company back in 1980, after graduating from Farmingdale's HVAC program in '77 and working in the field for four years. I've got some experience I could share with you, I've given it in the brochure. We do mostly commercial replacement installations, one and a half to 100 tons, chilled water systems and replacements, small ammonia systems, geothermal, heating and air conditioning systems, and we're certified by International Ground Source Heat Pump Association. We do water tower work, gas-fired heating, critical-timing jobs that have to be done in special situations. We replace the air conditioning and heating systems that cool the GSO and the ESO main control rooms for national grid, they're the rooms where they control all the

electric and gas that goes to Long Island; building management control systems, general electrical wiring, we're among the licensed master electricians in Suffolk County and Nassau County; UPS installations, we did a 300 KVA UPS for ADP Corp. in Melville; primary and secondary feeder installations, general refrigeration services, ice machine installations and service. We put the first ice rink in Saudi Arabia back in, well, 28 years ago, whenever that was. In 1994 I began … I was asked to design the replacement for the HVAC system for Nat Grid's office building in Brentwood, and they wanted to put in a geothermal system, that was my first experience with geothermal systems, and I studied the systems and design criteria and was able to install the 180 tons for that building. This job was published in the trade publication, the News, back in 5/15 of 95, and in later years I installed geothermal equipment in the Hewlitt (phonetic) office buildings and the Riverhead office buildings for National Grid, and I designed and oversaw the installation of a 30-ton geothermal equipment for a residence on 86th Street in Manhattan, which used

a standing column well, and saved the homeowner thousands of dollars on the project by eliminating the need for the rooftop water tower, the steel stoop structure on the roof water tower, and eliminating the need to run the chimney up from a boiler in the basement all the way through the six floors, which would also have taken up space in the house, and they wound up using the rooftop as a garden and part of the house, rather than just having it committed to mechanical equipment. And I've been a project manager for other geothermal jobs on the Island, and in the city we have to use building contractors because I'm not licensed in the city for the plumbing and electrical work. But it's something that I feel there's a big need for it in the city and it really is not that hard a system to put in, when you put a standing column well in. That was actually quite a bit easier, getting a well contractor in, closing off the sidewalk and sinking the well, and the system has worked for ten years and it's something that can be done all over Manhattan.

CHAIRPERSON GENNARO: That's my hope.

MR. McKEAN: But we're looking to forward that.

CHAIRPERSON GENNARO: Sure.

MR. McKEAN: And when I was asked to come down and talk about it being something that could be done and something that should be done.

CHAIRPERSON GENNARO: Sure, and I thank you for that. We're going to hear the statement of Mr. Bell, and then I'm going to have questions for you regarding what's going on in Long Island, because I want to … I'm from there originally, I want to talk about that a little bit, I want to get the benefit of your views as someone who has done other things too, but you have a very valuable perspective of which I'm going to draw on. I'm going to hear Mr. Bell's presentation, and then I'll have comments and questions for both of you. Mr. Bell.

MR. BELL: Thank you, my name is Rick Bell, I'm Executive Director of the AIA New York Chapter here in Manhattan, but previously I was also assistant commissioner for architecture and engineering at DDC where I ran the … or

oversaw the unit that we heard from earlier today. So my experience with geothermal is partly as an end user, and I think it's altogether appropriate to have end users on the last panel, at the end of the day. I would want to commend you not only for holding this hearing, but I have to say in many, many years of coming to a variety of different committees and City Council hearings on a variety of subjects, this is by far the most informative and educational hearing I've ever been to, and I really am sincerely grateful for going last, because I learned so much today.

CHAIRPERSON GENNARO: Me too, me too.

MR. BELL: So, that said, I'd like to read a brief statement, but then in questioning we'll both go beyond it.

CHAIRPERSON GENNARO: Sure, sure.

MR. BELL: Because we've been running a system for nine years now, and I can tell some of the stories of what we learned in putting it in and in operating it since. So forgive me for reading, but I'm not- -

CHAIRPERSON GENNARO: (Interposing)

That's quite all right.

MR. BELL: On behalf of the New York Chapter of the American Institute of Architects and its nearly 5,000 architects and affiliate members based in Manhattan, it is our distinct pleasure to offer testimony on this important issue. We support the goals of Intro 694, which if enacted would require a study to identify the most suitable zones in the city for the use of geothermal energy, both for building heating and cooling and also for electricity generation and the identification and tracking of public and private projects which are utilizing or expect to utilize geothermal energy. But you know that. For almost nine years, pretty much under the radar, there hasn't been all that much ink about it, we have operated the Center for Architecture at 536 LaGuardia Place in Greenwich Village, I would hasten to add that it was City Council-funded early on, and the geothermal ground source wells provide all of the energy for cooling of our 15,000 gross square feet of galleries and meeting spaces. When AIA New York Chapter created the Center for Architecture in 2003, green issues

were very much at the forefront of our programming and our design. As a client the AIA decided that a geothermal system was worth the initial investment, and I could also tell some stories about our interaction with the banks on that subject. The most notable part of the cost, it was approximately $100,000 back then, a while ago, was well drilling. The system was designed by Michelle Norris of Norfast Engineering and she was working with Andrew Berman, Architect. Each of our two wells took approximately a week to dig, that was from 1:00 to 5:00 in the afternoon, so as not to make too much noise. The drill descended the height of the Empire State Building without the antenna, almost 1,260 feet through the sidewalk, gravel, soil and bedrock. The drilling was noisy, it sounded like pile driving, and that was part of the reason we were careful to inform neighbors what was going on, the environmental benefits and to try to restrict the noisy part of the activity to the afternoons on weekdays and summer. Set up in the moving of the drill rig, there's a photo of it in the package that was copied for you, it took a little bit of extra

time, all total the two wells took three weeks in the summer of '93 in August. We had hay bells for the water containment and applied for all the necessary and relevant permits from DEP and DOT. The city was very easy to work with on this. One lane of traffic remained open, and the sidewalk protected by safety barricades also stayed open, as you can see from the photo, for passage during the drilling period. What I'd like to get to, maybe off-script, is how relatively easy it was to do, at least in our neighborhood. The center's geothermal system had two wells, has two wells, that provide an energy-saving boost for the heat exchange method in both cooling and heating modes. We tend to use it much more for cooling. Heat pumps use the 53 degree Fahrenheit geothermal environment as a reservoir from which heat is extracted in winter and into which heat can be transferred in the summer, far more efficiently than a conventional air exchange system in which heat pumps extract heat from freezing air in the winter and transfer heat into warm air in the summer. Water in the wells circulates back to ground level. During system operation, the water

moves cyclically through its 2,520 foot path, transferring heat from the heat pumps to the bedrock surrounding the well along the way. I hear it regulates the temperature of the air in all of our spaces, including our offices. We think this is one of the first geothermal installations in New York City, we've certainly seen others and have been trying on our own to track it. It's also, I think, one that may be the most publicly-accessible. We spent about $13,000 on a glass door to make sure that the basement space where this is located underneath the sidewalk is visible to any passersby, anyone in our space. Since the start up of the system, the center has, as I said, proudly displayed our mechanical system to all who want to see it, with an explanation for how it works. We've saved money and done a small part, I think, to help save the environment, keeping our space comfortable and free, we usually say the system is free and guilt-free, at least relatively so. To put the cost into perspective, the Center for Architecture at 15,000 gross square feet of construction had nine years ago a capital outlay of about $3 million,

which was pretty frugal, so a $100,000 line item was pretty significant. We calculated that there would be a three-year payback, but NYSERDA came through with a grant to defray most of the cost of the well drilling, and that made the calculations of payback period kind of moot. We would have done it anyway, but we haven't told NYSERDA that at any point in time. We're very, very grateful and always praise them for making it possible. There are several reasons why the system became the choice for the Center for Architecture, you've heard some of them earlier today in the technical presentations. It consumes less energy, about 30% less energy than a conventional air cooled condenser-type system would. It did not require any exterior equipment, such as large heat transfer grills on the façade in not quite a landmark district, but one where there's a lot of sensitivity. We also didn't have to put a cooling tower on the roof of a fully-occupied building with some seven floors of workspace above us who were none too keen to see something sticking through occupied space. It was installed as new technology and the retrofit of an existing

building, and because the system is entirely internal, as we've heard from others today, it has no noise impact on the street or on adjacent buildings. Lastly, it was estimated that the cost benefits would be very, very significant, as I said. In conclusion, we offer our continued support and professional expertise with efforts to allow for the expanded use of geothermal energy in New York City, and commend the New York City Council for putting forth this legislation and for holding this oversight hearing, both of which we see as being intended to make sure the initiatives that are now underway continue into the next administration. We invite members of the Committee on Environmental Protection to the Center for Architecture to see our geothermal energy system in action and firsthand, and thank you for the opportunity to testify today.

CHAIRPERSON GENNARO: Thank you, Mr. Bell, and we certainly would wish to partner with you and a local AIA chapter to try to advance this. And I would welcome the opportunity to come by and see what you have, and I would just like to direct staff to talk to Mr. Bell to see how we can

go and see the installation, and how we can generate some further interest in trying to get this going. And I'm telling you I didn't do this whole hearing today for nothing, and so I really want to make something happen and I didn't know about your installation, I know about it now, and I'm so happy that you've embraced it and been one of the pioneers in the city on it, and I want to see more of this. And I greatly appreciate you being here. And Mr. McKean, with regard to this trade association that's starting to happen in Long Island, we just heard mention that John was talking about. Right, John? Yeah. And is that something that you have become aware of, or did you notice it?

MR. McKEAN: I first heard about it today, and I wanted to speak to John about getting his card, so that I could get behind it.

CHAIRPERSON GENNARO: Yeah, I would certainly like to see a way in which your kindness for coming out here from Long Island, spending all this time, to give us your valuable perspective, was helpful not only to me but to you in some way, and so because your reputation has made its way to

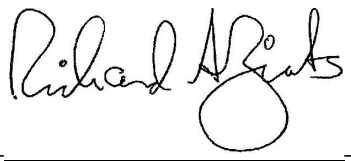
this Committee and Samara is like, "This guy is the best", and so there you have it. So we should … John Rhyner, right? Yeah, and so I certainly want to see this blossom, not only in New York City, but in the whole metropolitan area. I mean, it helps us all, and I am very grateful what you put forward today, and to give us the benefit of your views, and I hope that your contacts with Mr. Rhyner and others will be helpful to you as you grow your business.

MR. McKEAN: I'm sure they will.

CHAIRPERSON GENNARO: And I really, really appreciate you being here, and it's very nice of you to come here, and I think this is a pretty darn good hearing, if I do say so myself. And I say the word "darn" like on the record, rebel that I am. And so with all these witnesses being heard and no one else wishing to present testimony, I want to thank everyone for being here today, we're definitely going to do something with this. Thanks to one and all, and this hearing is hereby adjourned.

C E R T I F I C A T E

I, Richard A. Ziats, certify that the foregoing transcript is a true and accurate record of the proceedings. I further certify that I am not related to any of the parties to this action by blood or marriage, and that I am in no way interested in the outcome of this matter.



Signature_____

Date _____June 21, 2012_____