CITY COUNCIL
CITY OF NEW YORK

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TRANSCRIPT OF THE MINUTES

Of the

COMMITTEE ON ENVIRONMENTAL PROTECTION

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B E F O R E: COSTA G. CONSTANTINIDES

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A P P E A R A N C E S (CONTINUED)

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[sound check, pause] [gavel]

CHAIRPERSON CONSTANTINIDES: Good afternoon, everyone. I am Costa Constantinides, Chair of the Environmental Protection Committee, and today the committee will hold a hearing on Intro No. 1159, a local law in relation to the installation of solar water heating and thermal energy systems on city-owned buildings. In December of 2014, New York City enacted Local Law 66 of 2014 requiring New York City to reduce citywide greenhouse gas emissions by 80% by the year 2050. According to the city's inventory of New York City greenhouse gas emissions, buildings through the use of heating fuel, natural gas, electricity, steam and biofuel are responsible for 70% of citywide emissions. Given the fact that the majority of existing buildings are expected to remain beyond the year 2050, the city's base of more than one million buildings represents the greatest potential source of emissions reductions in New York City. Solar thermal systems are an efficient and economical technology to produce hot water and heat. These systems are designed to convert solar radiation into heat in order to provide hot water, or in some setting space heating. This is different from solar photovoltaic systems which are designed to convert solar radiation into electricity, the most common solar thermal system used in residential and commercial buildings if they heat water. This design is referred to as solar water heaters and/or solar hot water. Solar hot water systems generally consist of a roof mounted collector plate, which collects hat from the sun and pumps, which circulate water through the collector in order to warm the water for use in the building or house. There are many variations on or—and more complicated versions than this basic design. According to NYSERDA, depending on a building's energy cost, amount of sunlight and typical hot water usage, solar hot water might be an affordable heating source. Specifically, NYSERDA notes that in a typical residential installation electric hot water users can save as much as 2,000 kilowatt hours annually or up to 20% of their electric bill. First, solar thermal can replace or offset the use of fossil fuels, which in turn reduces or eliminates particulate matter and greenhouse gas emissions from heat oil burning systems. Second, separating domestic hot water systems from central heating systems results in more efficient space heating by allowing a building to downsize its boilers and cease operating during summer. Third, solar thermal systems can protect a building's finances from spikes in commodity prices. A sustainable future will require many changes in our energy production choices and a variety of technological advances must be employed. No technology should be left behind as we seek to meet the Mayor's mandate of reducing greenhouse gas emissions 80% by 2050. We will have to use all too— tools at our disposal to—in our end to mitigate the anticipated impacts of climate change and ensure our children a safe and healthy future. Now, we're going to do things a little bit different today. We're going to hear from a first panel that's going to be a solar thermal industry panel, and then we will hear from the Administration.

CHAIRPERSON CONSTANTINIDES: So please step forward.

SAMARRA SWANSTON: George.

CHAIRPERSON CONSTANTINIDES: George Engelbrecht.

SAMARA SWANSTON: Michael.

CHAIRPERSON CONSTANTINIDES: Michael DiPaolo. Sorry if I'm pronouncing it wrong, and—and Ronnie Mander—Mandler. Will you all please come—step forward and Samara will Swear you in. [pause] Wait a second—wait for the oath, wait for the oath. [laughs] Samara is going to swear you in.

SAMARA SWANSTON: Gentlemen, can you please raise you right hands. [pause] Do you swear or affirm to tell the truth, the whole truth and nothing but the truth today?

GEORGE ENGELBRECHT: I do. Okay. Good afternoon. I'm going to read our statement first and then we're going to through a Power Point. I am George Engelbrecht of Quixotic Systems. We are a leading solar--New York City based solar company specializing in solar thermal and I'm here with Michael DiPaolo. He's the President of Ritter Solar, which is a—a hot water distributor company international. He's the President of Ritter Solar, which is a –a hot water distributor company international. He's the President of Ritter Solar. Quixotic Solar has worked in the city since 1999, making us about the longest existing solar company in the metropolitan area. In this time we've installed solar hot water systems in New York City for residential, commercial and non-profit applications. Ritter Solar is the leading manufacturer of solar thermal equipment used worldwide. As a solar installer, who has worked exclusively with both solar thermal and solar PV systems in an urban environment, we believe our experience of installing and reviewing the data of these two forms of solar over the past 19 years uniquely qualifies us to offer a solid empirically based comparison of these two solar technologies in New York City. Though both solar thermal and solar PV generate energy from the sun they use very different technologies. Solar electric PV converts light to electricity and produces kilowatt hours. Solar thermal converts light to heat in the form of hot water. The results are therms or BTUs. Though not as well understood as PVs, solar thermal has widespread applications and is also very economical. It is ideally suited for the urban multi-story buildings such as those owned by New York City, and we will take you through the reasons.

1. Solar thermal uses the sun more efficiently actually than PV making it ideal for urban environments. Today solar panels have

increased their efficiency up to about the range of 17 to 21% meaning roughly 20% of the light that hits the panel will convert to electricity. In comparison the average solar thermal collector now has an average efficiency of between 60 and 80%. This higher efficiency of solar thermal makes it practical for city usage for a number of reasons. One reason is that many buildings have too much shade for PV. Because of it's superior efficiency, solar thermal can have applications for buildings that have too much shading to make PV practical. Shading rules out PV for a large percentage of New York City buildings. In our experience we have found that a significant percentage of buildings that are not suitable for PV can use solar thermal effectively. We also have the issue space. Roofs that are too small to make PV worthwhile. Even under the sunniest conditions a roof can be too small to fit a PV system that will produce a meaningful amount of electricity for the building. Solar thermal produces significantly more energy per square foot than PV, and thus even a small system can offset a substantial portion of a building's domestic hot water production. In addition, solar thermal systems continue to produce some hot water on cloudy days, whereas PV systems often cannot produce enough under these circumstances. This means solar thermal production is more predictable and reliable than PV. We have found in our experience that in some cases it makes economic sense for solar thermal and solar PV to work in conjunction on particular buildings. These hybrid systems provide more electricity and heat water through clean renewable resources. This an example, just our first slide shows you a small system that uses both PV and electric. Quixotic engineered and installed some—the first hybrid systems in New York City. The financial returns from solar thermal can be competitive with PV. The solar economics are highly influenced by government incentives. PV is presently enjoying a great number of incentives in New York State. In spite of the fact that these have generally been—there's been no NYSERDA rebate or New York City property tax abatements to support solar thermal, we still find that the solar thermal systems can stand on their own economically. The existing federal and state tax credits to—to achieve relatively short paybacks, returns on investment depend on a number of factors such as the size of the system, building fuel costs, et cetera, we find payback is often less than 10 years. For buildings still using heavy oils, these payback can be in the six to seven-year range, and we have demonstrated this through case studies, which we have developed from some of our recent projects. Again, which we will show in the Power Point. Now, when the projects can couple tax credits with additional support either from NYSERDA or through the New York City Economic Development Corporation comparable to monies available to PV, paybacks can be under five years, sometimes approaching three. If the city is to see more development in solar thermal systems for housing these state and city supported programs that are presenting targeting the PV industry can be—will be essential to allow third-party financing for solar thermal systems. Our company did the first third-party financing project for six low-income housing buildings in Harlem last year, and we will show that in our presentation as well. Solar thermal is often a better choice for residential buildings where the heating and hot water usage is greater than in the common electrical usage, and what you find in a lot of apartment buildings is the common area charges are very small. So, and—and these—so you each—each individual tenant has their own meter. This incentivizes them to keep their usage low—low, but it also means that the landlord’s electrical costs are only for the building’s common areas and thus relatively low making PV less economical. In contrast, residential landlords such as the city can realize significant savings from having their heat and hot water produced by solar thermal. Solar thermal is an excellent option for institutions such as hospitals, nursing homes that use large amounts of hot water. These types of facilities tend to use more domestic hot water on average per person than the average residential building. Hence hot water systems cannot set a higher percentage of the facility’s overall fuel use than in an average building. Solar thermal is also well suited for buildings still using oil. The solar thermal system will directly reduce carbon dioxide emissions whereas switching to—from electricity to PV does not have the same impact. One could argue that solar thermal is a purer form of distributed energy systems, since its energy is injected directly into the buildings’ heating system, the central nervous system, and unlike the PV system that is displacing power that is produced on site, but not on site, but on a—but at a central plant, possibly far removed from the building in question. Finally, because of the higher efficiencies we spoke of earlier, an average New York City roof covered with solar thermal collectors can thereby see a significant increase in admission avoidance. This could be very high—it could be a very high relevance in areas of the city that are plagued with poor quality of air. Solar thermal reduces the use and the stress on—on boilers. In this area, there's—there's a tremendous amount of waste heating of hot water outside the—the—the heating season. Large boilers are often used to create both steam and heat and hot water, but outside the heating season, they run a high—run at a high level and the—a higher level than is needed for domestic and hot water production. This is a very wasteful system. Solar thermal can create enough hot water to reduce the use of the boiler outside the heating season thereby increasing the longevity of the boiler and creating much cleaner air in the city itself. Based on our extensive experience with solar in the city, we believe that solar thermal should play an important role in any large scale carbon reduction and energy savings plan. New York City has great potential in building a thriving solar thermal market. This can provide many middle-class jobs, cleaner air quality, through significant emission reduction and reasonable rates of return for builder—building owners and possible investors. We urge the Council to create incentives to remote solar thermal, and to consider this as an important part of its goal to create a cleaner and more sustainable city. Thank you for your interest. So, we can take questions, but we also—but I think we wanted to step to our Power Point now just to give you some specific examples of projects we've worked on.

CHAIRPERSON CONSTANTINIDES: Is there any other testimony that you're going to give?

GEORGE ENGELBRECHT: Say that.

CHAIRPERSON CONSTANTINIDES: Does anyone else have testimony at the table.

MICHAEL DIPAOLO: [off mic] I would like to give you my testimony, and then we'll do the Power Point.

CHAIRPERSON CONSTANTINIDES: [interposing] Oh, then we'll do the Power Point—I mean the Power Point.

MICHAEL DIPAOLO: [off mic] Got it. Okay, thank you. [on mic] Good afternoon everyone. My name is Michael Dipaolo. I'm the President of Ritter Group USA, which a subsidiary of Ritter Gruppe, Germany. Ritter Gruppe is one of the largest solar thermal companies in the world, and my background I spent 25 years in the boiler business here in the United States operating one of the largest boiler companies, and then the last ten years I've been working in the solar field managing Ritter's business here in the United States. So some of my comments are redundant to what was--George just said, but I'll go through the highlights of my testimony. Solar thermal uses the sun more efficiently that PV, which the point I think is most important to understand right now is that it also provides great CO2 savings. So the conversion efficiency of a solar thermal panel or systems, solar thermal system is about four to five times greater than the conversion efficiency of solar PV. Correspondingly there is a four our five times greater saving in $CO_2$. The effects of government policy on market development I think is very important. Increasing governmental demand for solar thermal technology will allow the market to expand and become more experienced thereby accelerating technology innovation and increases in cost per installation. The positive effects of government policy on the PV market will be similar if enhanced on the solar thermal market. The guys on the solar thermal side feel like, you know, the—the ugly stepchild because almost all the subsidiaries and policy focuses on the PV side, and has—has bee--the solar thermal side has been relatively neglected. Solar thermal helps stabilize budgets. Energy costs are one of the largest items in the operating budget of property managers. The vitality of electric costs is small since rates are set by public utility commission in subject to cost justification. Long-term average inflation rate of electricity is approximately 1%. However, energy costs from gas and oil are highly variable, and cost price can create havocs on budgets. After a solar thermal system is installed a fixed energy price is known for the life of the system typically 25 years. So we have much more budget stability when we can control our thermal demand. Solar thermal contributed to improve building efficiency. One of our key target markets is increased efficiency of buildings to reduce our greenhouse gases. It's not just—renewables is one of the—one of the tools, but building efficiency is—is also one of them and solar thermal has great opportunities in this respect. New York City has a large percentage of mechanical rooms where boilers are used to provide both space heating and domestic hot water. These boilers are sized to cover the space heating demand on the coldest winter days. During the heating season these boilers have operating efficiencies of 80 to 85%. When boilers are running solely to provide domestic hot water, typically from May to October, the efficiency is less than 50%. During this summer period, solar thermal systems often provide more than 90% of the energy needed for domestic hot water eliminate the need for running boilers. Additionally, solar thermal extends the life of the boiler and reduces service calls. Solar thermal has an advantage that relates to energy storage. All of domestic hot water solar thermal systems include storage tanks, and the heat is typically available for 24 to 48 hours. While PV storage is possible, it is very expensive and not included in standard installations. Energy storage is standard on solar thermal systems. The benefits to solar thermal can be utilized after the sun sets.

Resiliency. To operate a solar thermal system a small—a small amount of electricity is needed to run the solar pump. This can be provided with a small generator or a connection to an emergency electric circuit. During emergencies such as Hurricane Sandy, where we had large weeks, seven, eight days without electricity, it is feasible to provide hot water during extended periods. Time is of the essence as it relates to tax credits that will be phased out. The city's budget for primary energy to produce heat and hot water is large. By not acting now to support solar thermal installations, the city is foregoing the opportunity to benefit from the 30% Federal Tax Credit. The Federal Tax Credit is scheduled to decline starting in 2020, and will be reduced to 10% in 2022. Additionally, the city should help itself by helping the solar thermal industry gain state tax credits through NYSERDA and the REV Program. Solar thermal systems—systems are as or more efficient than PV and reducing greenhouse gas emissions, decreasing energy consumption of buildings and converting to renewable energies. Roof space is—is limited. This is like the rumble for the roof, okay. Is it PV or is it thermal? What are we going to put on the roof? In the urban environments availability of roof space is limited. Is the—is the limiting factor holding back wider utilization of renewable energy? Roof space has become a valuable commodity. Therefore, roof space should be allocated to it's best and most productive use. Solar thermal is the best application from an environmental and financial perspective. Electric from utility size PV fields can be transported hundreds of miles while thermal en—while thermal energy has limited ability to be transported. Therefore, utilization of solar thermal energy is limited to on-site production and consumption, gives additional rationale for allocating roof space to thermal energy production, and that's my testimony. [background comments] So—so we put together some slides of some of the projects we've worked on that just demonstrate some of the—this is just a slide that—I mean it delineates how solar thermal works. We all know that. So this a project we bid. You want this? Yeah, go ahead, George. I'll—I'll jump in.

GEORGE ENGELBRECHT: [laughs] Yes, 30 apartment units, 20 solar collectors that we've installed this since 2011.

MICHAEL DIPAOLO: And you'll notice if you go back once, so you'll notice that's a flat plate collected. So we're going to show technology with different types of collectors. This is the financing on that. This—this—

GEORGE ENGELBRECHT: So the, yeah, $129,000 system. There is a six-year payback. It covers 50 to 60% of the annual hot water usage in the building, and this was just with the Federal Tax Credits, and depreciation.

MICHAEL DIPAOLO: That annual hot water it's—it's very common to the design of a solar thermal system what we call a solar fraction of 50 to 60% meaning 50 or 60% of the domestic hot water energy needed will come from the sun. So that solar fraction of 50 or 60% is quite common and—and should be a design goal.

GEORGE ENGELBRECHT: So this is a project we did for the Jewish Community Center in Manhattan

Island, 24 solar thermal collectors. Again, the economics were excellent. They did qualify for some NYSERDA funding NYSERDA, but again but that sort of put them on a level playing field with PV in terms of the amount of money that was available. And this is a major project we just completed. We did six solar hot water systems in a number of buildings up in Harlem. This is the first. This another rooftop. Here's another building we did and, of course, the interesting thing with solar thermal in terms of space we usually put it at 30 or 35 degree angle, which again reduces the amount of footprint that it has on a rooftop and—and space—rooftop space is—is the big battle in—in the city. So a lot of times you find you can—you can fit more solar thermal on a roof, and you have to offset, of course, but in some cases it actually works out better in terms of how you are—you're utilizing the amount of space you have to work with.

MICHAEL DIPAOLO: George if you go back one slide you can see this clearly. You know, this was in compliance, of course, with the Fire Department regulations where you have to have a landing area in the front of the building and the back of the building, and then basically an aisle way from the front to back so the Fire Department has access and emergency crews. That's also one of the things that takes away the space, the usable space. The—the—the number of collectors here was matched up to the size of the storage, and to the demand of the building. So we were—we were equalizing. We don't want to overproduce or under produce and we want to optimize, and we were doing these six projects together one thing was we were able to gain efficiencies because we had a set design. So all the designs in all six of these buildings are identical. And we've been working with the German engineering group Fermitter (sp?) with the Cortotics (sp?) Engineering to come up with basically a cookie—a cookie cutter design and with the goal of—of reducing costs, driving costs down on the installations. [pause]

GEORGE ENGELBRECHT: So and here is just breakdown of the economics in—in terms of the estimated pay back and the cost of the project. So, you can see if solar thermal is done correctly and it's done efficiently, you can have—you can realize a very sure return on investment in New York City.

MICHAEL DIPAOLO: So these systems basically they offset per square foot a solar panel offsets 2.5 gallons of fuel oil per year. So these were all—all boilers that we were integrating with.

GEORGE ENGELBRECHT: And then just to show some examples, in—in a lot of cases it makes sense to do a combination system. This is the hybrid system we did where we combined PV and solar thermal, and this is another system where—where we utilized both hot water and PV in conjunction. And this is a small co-op and this is-this is—this is a great example of, you know, where you have a building that has a very small amount of common area usage in terms of their electricity. So we offset the total of their—their electrical use with the common area, and then we—and then we are, you know, are supplying them with all their domestic hot water needs for the building as well. And this—this is another example of a hybrid system for a single family residence, and this is an example of, you know, how you can utilize both system where you put the solar panels PV on the south facing roof, but then you put the hot water panels on the west facing roof where—where they'll—

they'll realize their most—most efficient production of heat. So, that's—that ends our testimony.

[background comments]

RONNI MANDLER: Okay, first, you know, my name is Ronnie Mandler. I am the President of Best Energy Power, and this is my testimony. Dear Council Member, first I would like to thank the New York City Council calling upon to come and testify. The solar installer with the help of all advocacy agencies and companies are the ones who are actually reaching out to the community and promoting the clean energy of solar. We are also the ones that actually makes it happen. I would ask the New York City Council not to push for any new legislation for solar thermal. As you well—as you well know, the roof space in an urban area such as New York City has limited available roof space, and as such, solar thermal will always compete with solar PV on that limited roof space. Solar thermal is effective only about five months a year in our area due to the fact that solar thermal harvests the sun's heat versus solar PV, which is effective 365 days year because solar PV harvests the sunlight, and is effective in any temperature. Furthermore, any investment is evaluated by the alternative.

CHAIRPERSON CONSTANTINIDES: Okay.

RONNIE MANDLER: The return of investment of solar thermal in our area is about 15 years while solar PV return is about five years. The life span of solar thermal is about 12 years, and it has moving parts. While the life span of Solar PV is 25 years, and there's no moving parts. We have to prioritize what we do first, and it's obviously in solar PV. Having said that, there is a new technology where panels of solar thermal can be attached as a patch under the solar PV. As we all know, solar PV panels dissipate some heat under the panel. So if we have already solar PV with a mounting system, which is already installed, we can add these patches of solar thermal under the solar PV. This will always—also reduce substantially the cost of solar thermal. This technology is new, and nothing that today is available yet. I believe in two to three years, it will come to market with a track record and data how to do it right. So, in general what I'm saying solar thermal is not bad, but we have to prioritize. So if the efforts I would ask the Council to prioritize the solar PV versus the solar thermal. Thank you.

CHAIRPERSON CONSTANTINIDES: Thank you for your testimony. Appreciate it. So the front—Michael, don't go anywhere. I have questions. [laughs]

MICHAEL DIPAOLO: Sorry.

CHAIRPERSON CONSTANTINIDES: So, we're looking at a difference stratocracy on buildings. But before I start my question I want to acknowledge that my colleague Council Member Donovan Richards, a member of the committee and Chair Emeritus from the main floor. Thank you, Donovan for being here. So looking at the different city stock, and we have schools, hospitals, libraries, courthouses, wastewater treatment facilities, firehouses and, you know, a recreational center, police precincts. In general, which types of these buildings might be able to use solar thermal systems?

MICHAEL DIPAOLO: Well, all of them, but here's what we—

CHAIRPERSON CONSTANTINIDES: [interposing] Well, most cost-effectively. Let's—let's look at--

MICHAEL DIPAOLO: Anyone whose using domestic hot water is a candidate. Again, buildings that have larger uses of hot water like prisons, hospitals and schools typically have a very low relevance of domestic hot water demand. Residents, of course. Typically 25% of buildings and—and annual energy goes to domestic hot water, and what we found in Harlem, and these were basically six-foot walk-ups for apartments per floor, we got a nice balance between the roof space and the space in the—in the—in the room boiler for the tank, and the demand of the building. So we were able to balance that.

CHAIRPERSON CONSTANTINIDES: Today looking at prioritization, it would be in—in—in buildings where water is used quite frequently. Right? You said prisons and hospitals.

MICHAEL DIPAOLO: Primarily like prisons needs, seven being in demands, and now the schools that out for three months.

CHAIRPERSON CONSTANTINIDES: Right.

MICHAEL DIPAOLO: Those that receive it on a regular basis will be the first priority.

CHAIRPERSON CONSTANTINIDES: And looking at, you know, the—what—what is the average size. You showed lot of different types of roofs, a lot of different types of—of potential systems. What are the average size, cost and payback period for the projects? You said about five years or so?

GEORGE ENGELBRECHT: Well, like I said, it depends on the incentives that are available that we're finding, and it depends on the size of the systems. The big differential with hot water is basically now the hot water is being heated in the first place, if it's—particularly if it's—if it's oil and heavy then your—your payback is—is much shorter than like if it was natural gas. But there—there are various sizes involved, and as we said like in—in terms of across buildings in cases where there isn't a huge amount of electrical use in the common area, and where we've taken an incredible—a large amount of reworking of the electrical system to give each tenant a piece of electricity from that roof, it works to be more efficient to—to offset their hot water usage as opposed to their electrical. So in those kinds of situations apartment buildings could make sense in a lot of cases to go with the solar panels at this point.

CHAIRPERSON CONSTANTINIDES: Well, as far as maintenance, does the work require any special training? Well, it—it—is—it is a plumbing system. So there is, you know, you need—you need plumbing experiences a lot. There are those aspects of it. Just like the PV, you know, you need electrical plans.

CHAIRPERSON CONSTANTINIDES: And what's that-

MICHAEL DIPAOLO: Typically installed in flaws (sic). They're all connected to the Internet, and to our email addresses, and if there's any system fault if the controller got that, detects. We get an email that second. So, the building manager, the installing engineer, whomever we wish to give really our notice to, if there's a fault on the system, you know, pumps can go bad, controllers can go bad, we get notified right away so we can go—it's not sitting there not—and were not knowing that it's not operating properly.

CHAIRPERSON CONSTANTINIDES: Right and how—how—how much of the—the cost and maintenance usually, you know, cost the building owner or the person who has installed that?

MICHAEL DIPAOLO: The pumps typically have a life of ten year, and these are relatively small pumps. They're—they're less $1,000, $800 a pump. So if you had to switch out a pump it's $1,500 job. You know, there really is no moving parts other than the pump and a small electrical controller.

CHAIRPERSON CONSTANTINIDES: Alright, I mean I just want to, you know, as we look to 80 x 50, I'm looking to see, well, every technology. I'm a huge proponent of solar. We've had hearing on solar PV and solar in—in the past, and look forward to doing that in the future. I just want to make sure that we're not leaving any technology behind when we can potentially be heating our hot water and still using photovoltaic at the same time, and if it's cost-effective and it works, and we can get a good payback, I think it's worth us going down this road to see how we can use our roof space most effective. So I—I agree with everyone here. That is a premium. We have to make sure that we're doing it the right way and that are not leaving any stone unturned as we look to the future to meet the 80 x 50 iniaitive—mandate because it's—it's a big one, and we don't have time to wait especially with what we're dealing with in Washington where it's good policy now. It's not going to be coming from them. So I want to thank you. Donovan, do you have any questions?

COUNCIL MEMBER RICHARDS: No.

CHAIRPERSON CONSTANTINIDES: Alright, I just want to thank you all for your testimony today, and I will definitely look forward to partnering and working with each of you at this table as we look to expand solar even further into New York City so thank you for your time.

RONNIE MANDLER: So thank you.

[background comments]

CHAIRPERSON CONSTANTINIDES: Hi. I'd like to have Anthony Fiore from the Deputy Commissioner and—and Chief Energy Management Officer for DCAS, John Lee, Deputy Director of Buildings and Energy Efficiency for the Mayor's Office of Sustainability, and Ellen Zielinski. I hope I got that right. [laughs] Director of Clean Energy and Innovations Technologies for DCAS. Samara will swear you guys in.

SAMARA 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?

I do.

CHAIRPERSON CONSTANTINIDES: Alright, sir.

DEPUTY COMMISSIONER FIORE: Good afternoon, Chair Constantinides and members of the Committee on Environment Protection. My name is Anthony Fiore. I'm the Deputy Commissioner and Chief Energy Management Officer for the Department of Citywide Administrative Services, also known as DCAS. Joining me today is Ellen Zielinski Director of Clean Energy and Innovation at DCAS and Mr. John Lee, Deputy of Buildings and Energy Efficiency for the Mayor's Office of Sustainability. Thank you for the opportunity to testify today regarding the potential use of solar water heating and thermal energy systems on city-owned buildings. As part of One NYC Built to Last, the Climate Action Plan, this Administration set forth an ambitious goal for reducing citywide greenhouse gas emissions 80% by 2050 over a 2005 baseline known as 80 x 50. Recognizing its own impact on the greenhouse gas emissions, this Administration is leading by example to reduce greenhouse gas emissions from municipal buildings 35% by 2025. I would also like to acknowledge the tremendous partnership between the administration and this committee. They have done a lot of great work over the years with more to come. A key component to reaching our greenhouse gas emission reduction goals is the installation of clean energy technologies at our city facilities, and we have a goal to install 100 megawatts or more of solar PV power generation capacity on city-owned properties by 2025 the 100 megawatt goal. To date, we have 8.9 megawatts of solar PV installed, and another 20 megawatts in the process of being planned and installed. In addition to standard rooftop solar PV, DCAS has actively been assessing and installing alternate clean energy technologies including fuel cells, battery storage systems, building integrated photovoltaics, wind, geothermal and solar thermal. Over the past few years, 14 solar thermal systems have been installed on municipal properties. As Mr. Engelbrecht testified, solar thermal is best suited for buildings that have a 24-hour domestic hot water demand and high hot water heating costs stemming from showers, swimming pools, cooking and dishwashing purposes. Examples for suitable buildings would be large residential buildings, dormitories or gymnasiums, with around the clock hot water usage. Because of the need for a high hot water demand, city-owned buildings and operated buildings largely do not have the ideal water usage characteristics needed to take full advantage of the benefits and core purpose of solar thermal systems, namely offsetting the fuel use and cost for hot water heating. Buildings such as schools office buildings, courthouses, police precincts, and sanitation garages, which compromise 90% of DCAS' portfolio are not ideal candidates as they have inadequate hot water use demand to make solar thermal projects economically viable. In addition, solar thermal requires dedicate maintenance and oversight. Unlike solar PV, which has passive systems, and only requires relatively simple maintenance by an electrician, solar thermal systems are mechanical systems that have many moving parts including pumps, tanks, control systems, solar collectors, pressurized piping and heat exchanges. These systems are much more complex than solar PV and they require dedicated skilled electricians and plumbers to maintain. Commissioning and retro commissioning of the system is also required. The equipment requires regular checks and monitoring as failure of system components is possible. More than

20% of the systems installed on public facilities to date completely failed due to multiple reasons including freezing, control system failures and external system damages from birds and golf balls for example and at least two other systems required repair work. If one collector fails, it can shut down the entire system unlike solar PV where one failed panel has less negative effects on the larger system. Our city agency partners have expressed to us that they do not have staff that are trained in solar thermal maintenance and operation. Based on our experience with solar PV it is critical to have adequate staffing and expertise in place to ensure proper operation and system longevity. To address this need for the comparatively low maintenance solar PV systems of DCAS' expanding Solar PV Program, we are developing an operation and maintenance plan and a maintenance and repair contract. In addition, we are rolling out a solar PV training course for city employees so staff are knowledgeable about the solar PV systems on their rooftops. No such arrangements have been made for the solar thermal systems. An additional and distinct programming and resources would be required. DCAS worked with the New York

Power Authority, NYPA, and the FDNY to install solar thermal systems on five firehouses in 2013. The total cost of the five projects was $778,014 and had an average payback of approximately 80 years. At these firehouses, the hot water demand was insufficient to make each project cost-effective. These projects suffered from a number of problems, and within one year all systems were compromised and need of—and in need of repair. Three out of five were not functioning entirely. The systems are now being repaired. Because of the multiple components that a solar thermal system contains, the rather straightforward analysis to assess a building's potential for solar PV is not repairable with solar thermal systems. A considerable facility specific engineering analysis is needed to determine if a solar thermal system is feasible. An analysis of a building's domestic hot water demand and heating fuel costs associated with hot water supply as well as an assessment for space, for collector's pipe runs penetrations, existing equipment locations, and space for the additional equipment like heat exchangers. Given this complex process, it is much more difficult to determine the solar thermal potential for a city building. Unlike solar PV, DCAS and city agencies do not have the resources to assess every city—city building for solar thermal. Most important, solar studies have demonstrated that electrification of heating systems combined with the renewable energy supply will be needed to obtain the levels of greenhouse gas emission reductions necessary to prevent catastrophic climate change impacts. The city's own studies conducted with a broad range of stakeholders including leaders in real estate, architecture, engineering, construction, finance, affordable housing and Environmental Justice came to the same to the same conclusion. Solar thermal systems compete for the same roof space used for solar PV installations that would support electrification of heating systems, and could significantly delay a necessary transition to electrification. Importantly, however, we recognize that solar thermal systems can be good practice in New York City in setting this where substantial hot water demand can be met with renewable energy rather than fuel oil. As the technology continues to improve, the use cases for solar thermal may also expand. This recognition is why we worked with the

Committee on Environmental Protection last year to allow for the exploration of solar thermal technology as an alternative sustainable roof use when crafting Local Law 24, which supports our existing solar PV program on city-owned buildings. However, with the knowledge that solar thermal is unlikely to be the most environmentally and fiscally beneficial option for the city's portfolio of buildings, we offer our continued partnership to work with this committee to explore alternative means of supporting the private marker—market for solar thermal in New York City. While our research demonstrates the electrification of heating systems is currently the more effective path to reduce on-site combustion for heating needs, we should nevertheless offer support for New York residents and businesses who choose to explore solar thermal based on personal preference. DCAS is fully committed to pursuing clean energy technologies. However, based on our experience with the solar thermal systems implemented to date, the opportunity for effective use of these systems across the portfolio of municipal buildings is limited. For all of the reasons just elucidated, and the significant effort required to perform a reasonable facility—

facil—excuse me—feasibility study, it does not appear to be a prudent investment at this time. DCAS takes seriously its responsibility to lead by example to help the city attain its 80 x 50 greenhouse gas reduction target, particularly by demonstrating innovative clean energy technologies. To that end, we are certain that we can find common ground with the Council to help move away from dependency on fossil fuels. We support the continued dialogue with the solar thermal industry, and our agency partners to unlock new opportunities for solar thermal as the technology progresses to speed up the deployment of clean energy technologies and improve air quality and public health outcomes. Thank you again for the opportunity to testify this afternoon. My colleagues and I would be happy to answer any questions you may have.

CHAIRPERSON CONSTANTINIDES: Thank you. Do you guys have any other testimony as well or--? Okay. I would like to recognize my colleague Eric Ulrich, our Council Member Queens. Thank you for being here, Eric. So, I'll begin at the same place that you started where I definitely value the partnership that we've had over the years. You know, this is something that we—we've done a lot of good, and we will continue to do a lot of good together, I look forward to continuing that. So everything that we talk about today is in—within that framework. You know, and I bought this phone a couple of years ago. You know, it was the best technology possible, and now it's about three years old and I think it's probably ready to be retired because it doesn't do all the things that everyone is looking to do, and iPhone 7 and everything else. My point with that is that over time technology changes, it improves. We always have to sort of be looking out for how the technology is—is evolving over time, and how we can see good things happen not just set something aside because we've had previous bad experience in—in previous years. So looking at the firehouses, I—I guess the—the main factors and the long payback was just because we put them on buildings that were the high—the hot water usage was just not high enough to generate the payback, correct?

DEPUTY COMMISSIONER FIORE: That's correct. The hot water usage was not high enough as the previous panel I think testified to as well and

I'd like to point out that DCAS has its finger on the pulse of--

CHAIRPERSON CONSTANTINIDES: [interposing] Uh-huh.

DEPUTY COMMISSIONER FIORE: --of clean energy technology markets. We have a specific program geared towards innovation, and innovative technologies. So we are—are of the same opinion as you not to set any technology aside, but to continue to watch how technology evolves, and how the markets around those technologies evolved, and to integrate and scale those technologies at the appropriate time.

CHAIRPERSON CONSTANTINIDES: Right, and as—as you look at certain buildings so I mean there are certain buildings that it—it may not work for, right, and we'd sort of come to that same conclusion with the installers and—and—but in—in buildings where there are a high water usage, solar thermal could have some benefit if—if, you know, especially when we—have a large enough roof space to support both PV and solar thermal, and I could see how we have 25% of the—they had talked about before 25% of the—the heat for hot water. We could definitely utilize our system such as solar thermal to get us to do both, right?

DEPUTY COMMISSIONER FIORE: Yeah, we—we believe that there is a place for solar thermal. We believe it's more of a niche application, but there are certain buildings where the economics of it would be better than many other buildings most of which in DCAS' portfolio don't fit the water consumption patterns that would make it cost-effective, and I'd also like to bring back to the—the longer term point of if we're going to electrify these systems, which many studies including the City's study indicated it was the best path to go down to. We want to be careful not to do things that could delay that.

CHAIRPERSON CONSTANTINIDES: [interposing] And how-

DEPUTY COMMISSIONER FIORE: [interposing] And with that being said, we—we do believe that there—there are applications where this has—has better economics and it's a good thing to do.

CHAIRPERSON CONSTANTINIDES: And as far as this—this electrification you talked about, how far off are we from seeing that technology, getting there? I mean where are we on that particular technology?

DEPUTY COMMISSIONER FIORE: So, I would reflect a comment that you made earlier that, you know, time is of the essence--

CHAIRPERSON CONSTANTINIDES: [interposing] Right.

DEPUTY COMMISSIONER FIORE: --right, and the technology is there. It's not that the technology has to develop, but the right policy and regulatory frameworks need to be put in place, and we see, you know, we're actively working on that.

CHAIRPERSON CONSTANTINIDES: Alright, as far as the projects that we did see that were put out, how did we come to finance those buildings? How did we come to choose the installers? How did—what—what was sort of the process we used to sort of get those buildings done?

DEPUTY COMMISSIONER FIORE: I'll let Ms. Zielinski that that.

CHAIRPERSON CONSTANTINIDES: Alright.

ELLEN ZIELINSKI: [coughing] Hello, there. So my understanding is that those projects were financed a few years ago through an SEP grant, and other funding that we had available and we did work with the Fire Department because they did have an interest in being early innovators and testing that tech—that technology. So they have shown interest, and I think they've been continuing to investigate to see how to make the economics of those types of installations work. One other quick point that I wanted to make in regards to your comment about other innovative technologies because the common theme that we've heard is the roof space is a limiting factor. So I also wanted to mention that. We are looking at technologies, solar and renewable technologies that don't necessarily need a roof space. So, some of the innovative technologies we're looking into include building integrative solar. So it's actually on the façade of the building.

CHAIRPERSON CONSTANTINIDES: Uh-huh.

ELLEN ZIELINSKI: Then also there is some really interesting lightweight architectural solar. It's actually a solar fabric and it's actually being designed and manufactured at the Brooklyn Navy Yard, and we found out about a really interesting technology. So we are actively advancing some demonstration projects because we think it could help deal with some of the constraints that we have, and we're trying to see the problems that we have and think a little more creatively. So as those demonstrations advance, we'd be happy to share the results. They will be some of our first projects.

CHAIRPERSON CONSTANTINIDES: Yeah, I would love to see that. I mean I think—as—as—as I said earlier, I think we really want to continue to innovate. I know we have done that, and—and continue to do that together. So I think—I'm very excited about hearing the other take on it. (sic)

ELLEN ZIELINSKI: We're trying to think beyond the rooftop, as we like say.

CHAIRPERSON CONSTANTINIDES: Hey, you know, I [laughs] think outside the box, think outside the rooftops. It sounds scary I mean especially when we realized that rooftop space is limited. So, you know, that's been a—a common theme today whether it's for PV or for solar thermal, and there's certain rules that we have in place that we need to maintain when it comes to rooftop space. Just looking at the—I see basically the most expensive part about the solar thermal is the installation or is it—is it the maintenance over time or what—you know—you know, what—what—what is—just walk me through where you feel we're spending the most money in the future.

DEPUTY COMMISSIONER FIORE: So, yeah, right. It's both of those right? So, the—the upfront costs for—for the equipment installation is still much higher than for the solar PV systems. The cost for the solar PV systems have come down incredibly and continue to decrease, and the maintenance costs when you—we have some data that indicates when couple the capital costs and—and maintenance costs for solar thermal it can be up to four times the cost of a solar PV system.

DEPUTY COMMISSIONER FIORE: Because I'm just looking at some of the—the slides that previous panel had and they talked about, you have a 5-1/2 year paybacks, 4-1/2 year paybacks, 6-1/2—you know, 6-year paybacks would seem pretty close to where we want to get, right so--

ELLEN ZIELINSKI: I could just chime in quickly, too, to say that a key factor here is—is finding the right site.

CHAIRPERSON CONSTANTINIDES: Right.

ELLEN ZIELINSKI: And so if you could match those necessary water characteristics the residential buildings were a great fit for the technology. You know, that's kind of the key. Like how do we get the economics is making sure that we're selecting the right building, and just for example schools are a full quarter of our whole portfolio. So we do have some limitations in finding that right fit. But it doesn't mean that we've ruled—ruled it out. It's just making sure that we're smart in how we determine the technology.

CHAIRPERSON CONSTANTINIDES: Alright, so it's really again just, you know, drilling down and—and finding a better way to partner on it, right? That's rally what we need to do is looking at the portfolio and finding where we can do it, and doing it where it makes sense. I'm happy to continue those conversations with—with both—with all of you, and with the installers to see how we can get that done. Just my colleagues over to Donovan and any questions? Alright. So, again, I—I am definitely looking forward to working with you. I—I do believe that solar thermal does have place, and as you have said, and we're going to continue to explore that option and as we move forward to meeting our 80 x 50 mandate, as we are seeing Washington stepping away from the plate, I know that we're stepping up to the plate and that we're going to be taking some serious swings to get us where we have to go to combat climate change. So I appreciate your partnership and looking forward to working with you on also—oh, very quickly, very quickly, I think since I have you here. I—I was about to close, but since I have—how are doing with the FDNY? I know that they've been trying to go electronic with the submissions for variances on—for solar. So how—how are we doing on that? Any new information? [background comments, pause]

DEPUTY COMMISSIONER FIORE: No, I—I'm sorry. We—we don't have any new information on that at this time.

CHAIRPERSON CONSTANTINIDES: Alright, well, I'll check up with you again. Since I figured it's a solar haring, I—I just—it just—as we have many solar installers here I know that's something that they care about deeply, and seeing how we can speed along that process so—

DEPUTY COMMISSIONER FIORE: Well, we'll look into that for you and get back to you.

CHAIRPERSON CONSTANTINIDES: I definitely appreciate that definitely, and thank you all for your testimony. I'm look forward to partnering with you.

DEPUTY COMMISSIONER FIORE: Thank you.

CHAIRPERSON CONSTANTINIDES: Alright. [coughs] Alright, so we have—next up we'll have Douglas Falconberg from Fly Beach Start, LLC. [background comments] Jessica Baldwin from Solar Plumbing Design and Gaylord Olson. Will you all please step forward and be sworn? [background comments, pause]

SAMARA SWANSTON? He has a Power Point he wants to present.

SERGEANT-AT-ARMS: [off mic]

SAMARA SWANSTON: The professor. On the left hand side Gaylord Olson.

SERGEANT-AT-ARMS: [off mic]

SAMARA 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?

PANEL MEMBER: I do. [pause]

CHAIRPERSON CONSTANTINIDES: Are you ready, Professor Olson? You want to begin. Well, actually let's do you last since you have the Power

Point presentation. Alright, so start here and then we'll—we'll finish up with you with Power Point.

PROFESSOR GAYLORD OLSON: Okay, great.

JESSICA BALDWIN: [off mic] Hi, I own a business [on mic, pause]—that are funded by--

SERGEANT-AT-ARMS: You Have to start all over.

JESSICA BALDWIN: [on mic] Okay, sure. I own a—I own a business called Solar Plumbing Design. We install the 80% solar thermal and 20% photovoltaics. We've had an increase in employment over the past couple of years. We mainly do a lot of multi-family installations funded by the present HPD, and we've also done work for the New York Power Authority who have seen some of the sites I've been referred to. I'd like to testify to the mechanical durability of the systems based on live monitoring data. I'd like to testify on the benefit to small businesses in New York but I'd like to talk about electrification. In this space I have a lot of field experience with all of these things. I think the biggest issue is really the—the mechanical—the mechanical feasibility that we've been running into as the gentleman who was speaking and was pointing out about the deficiencies with Fire Department systems. I would like to bring to the table the comparison between a boiler and the solar thermal system noting that all of the mechanical requirements and the maintenance requirements are the same solar thermal since it has an exterior component, has a little bit more added to it, but in every way that a photovoltaic system has an exterior component, that's not a huge consideration. The boiler might cost—cost about the same amount per therm or BUT or solar BTU produced as installing a solar thermal system, your boiler, you're paying-I—I—I spent five therms worth of gas today. That would be say to heat a 10-family building, or you can say oh, look, I made three therms today for the same price I put down to spend five therms a day. As far as okay, let's look at the real issue feasibility of installing solar panel systems on publicly owned buildings. As far as the roof space goes, solar thermal occupies one-quarter of the physical space that photovoltaics has to occupy to produce the same equivalent energy, and in relation to electrification, that's an argument for solar thermal because to offset electric hot water, to do it with photovoltaics or any other electrical on-site generation technique would be—wouldn't be possible given the roof spaces that are there. With solar thermal it's possible. As far as integrated solar, solar thermal makes a lot more sense than photovoltaics because its angle losses are a lot less especially with evacuated tubes. If you're doing building integrated solar on an electrified building you choose solar thermal. So, this guy is putting up the argument for solar thermal not against it when he talks when he talks about electrification. There are a lot of failures. I mean I totally admit to that. I repair a lot of systems. I'm just going to say that. A lot of it is due to a lack of oversight. Like in any other failure in any other department there needs to be some kind of oversight. Okay, let's go back to the boiler thing. If your boiler fails, you know it because you don't have hot water, but the boiler is backing up the solar thermal. If the solar thermal fails, the tenants or the end user is never going to feel it. There has to be some kind of monitoring because when a system goes down it can degrade faster just like a—a PV system would or any other system. There has to be—there has to be oversight. I recently repaired a very large Ritter, actually installation. It’s seeing our clients so that’s a state facility, but using the same technology that was implemented at the Fire Department. The—the system is amazing producer of energy. It’s for a dormitory. There’s a huge hot water demand. The reason the systems were failed when I got there was because of the lack of maintenance by the facility there. They had—they had let the system be shut down for too long in the winter so there were burst pipes and that’s what I went there to fix. But that’s so simple to avoid. I have an online monitor that gives me alerts in any of my systems. I have even one parameter that’s off, and my guarantee as an installer is that I’m going to fix that right away within the time period that’s in my contract. So that I don’t have failure. There—there are—there are simple easy ways for like in a city contract to address any risk of failure. It’s really not our responsibility on both ends, and other than that, solar thermal is the way to go. I mean you use less building space. You have a lot more options on how you come down to it, which that interferes with Fire Department requirements less. There are—I also want to just point out the kind of obvious fact that there are several large management companies that use solar thermal repeatedly. They love solar thermal. This is like I said this is a 30-year-old system. I don't have it hooked up to the projector, but it's right here, and today so far it's made 16,000 total BTUs and it's 32 years old and it's medium sized. So as far as durability and mechanical integrity this system has been down for one year before I came, and started it up again. But this owner is currently installing a new solar thermal system for them. They have several others. There are several property managers in New York City who could be here testifying to the integrity of the systems. So thank you very much and thank you so much to the Mayor and the Council for taking bold moves to—to help move quickly towards the vey important goal of environmental protection. I appreciate it.

CHAIRPERSON CONSTANTINIDES: Thank you. Thank you for your testimony. Please stay on the panel because I'm going to ask question after everyone goes so--

DOUG FALCONBERG: Okay, my name is Doug Falconberg, and I'm the President of VLIB (sic)

Solar. We do development projects for solar hot water and, you know, as—as I sit here and listen, I'm always amazed by the misconceptions about solar hot water, and how it works, and what the—you know, what the issues are. The reason I went into business in New York City aside from the fact I've lived here my whole life, is because this city is uniquely positioned for solar hot water. If you look at other major cities around the world whether it's Shanghai or Tel Aviv or Beijing, nearly every building will have solar hot water. When you have tall buildings that use hot water, solar hot water it makes sense. Not on Walmart. Walmart you put PV, but in New York City there's a lot of buildings that are tall and a lot of them use hot water, nursing homes for example, hospitals, senior residences, laundromats, apartment buildings. It's—it's a long list. Why don't you put PV on these buildings? Because is PV is much less efficient. We've heard testimony here five times less efficient, and that would a typical number. Also, the solar hot water offsets the carbon dioxide and the stuff produced at the point where it's installed not in Upstate New York or Canada where the electricity is produced, but here at home. This is important. One of the misconceptions is that it's—it's a year-round technology. Well, it is. In our systems I see 140 degree water coming out of the system on cloudy days in the middle of the winter. In the summer it produces a lot more heat, but also in the summer if you come up to my neighborhood in the Bronx or in Inwood or Washington Heights where I work, you also see in the summer black soot coming out of the smoke stacks. It's like thick black clouds of soot coming out because they're firing up the boiler to make hot water. Okay, with the City I'm aware has the No. 6 oil and they should have to—we wean off No. 6, and they should be part of that solution as well. The payback you've discussed and the numbers that I—that I heard discussed for payback roughly jive with ours. If you have a natural gas system with no incentives because it's not for profit you're going to see payback numbers in the order of 13 years. It would be a natural gas where the user has a tax appetite for the 30%. You'll see payback numbers on the order of six, seven, eight years. For oil the payback is much higher. For oil you'll a—a payback of five or six years because oil is more expensive than natural gas. Not every area is appropriate for natural gas. We see this all the time. Con-Ed wants $2 million to connect us to the—to the main in the middle of the street. So natural gas even in New York City is not universally available at the levels needed to heat a boiler, and at that point it's oil or solar hot water. So, you know, that's where we come in. What I haven't heard anyone here discuss today are synergies. The biggest problem I face trying to sell solar hot water is people don't know what it is, and they can't see it. Okay. If they've never seen it, they don't believe it will work. I've had laundromat owners in the Bronx say, you know, show me a laun—laundromat that's using this, and I'd say well I can take you to one in Queens, and they'd say well, I don't want to—to see it in Queens. I wanted to see one in the Bronx. Because apparently in the eyes of that person, the laws of physics that apply in Queens do not apply in the Bronx. So having just the ability to point there's one and there's one and there's one, will dramatically improve the adoption of those technologies throughout the city, [bell] and I think those synergies are very important. Just because to address the maintenance issue. If—if you have a building engineer, which you need to maintain your boiler that same engineer can maintain a solar plumbing system. If the monitoring system says this pump has failed, you can contact the—the building management and say have your building engineer, your maintenance guy replace the taco pump in the basement, and you tell him which one had failed. He flanges come off, they cut it out, the flanges come off, the new one comes in and they're back up and running. I don't really—Jessica is also correct. A lot of these systems in the past were very, very poorly designed. We see it as well that—that this wasn't done or it wasn't sized correctly or some other things were not done that should have been done, but I think with the technology today being improved, I think a lot of those design issues don't exist today because we know how to build and we have the certification standards now, and so on. So that's about all I have to say at this time. Thank you.

CHAIRPERSON CONSTANTINIDES: Thank you, Mr. Falkenberg. Professor Olson. [pause]

PROFESSOR GAYLORD OLSON: Well, thank you very much for inviting me to testify. My name is

Gaylord Olson. [coughs] I—I live in Princeton, New Jersey, but I get to New York quite often, and I'm on the Industrial Advisory Committee for Mechanical Engineering at Temple University in Philadelphia. And on the screen there is a presentation that was done in San Francisco last summer, but it relates to this topic, but I'd like to expand your thinking in the direction of seasonal storage. [coughs] Now that might not be happening on Manhattan Island, but is it correct for me to understand that [coughs] the College of—or part of the New York City ownership extends to Queens College and Brooklyn College and Manhattan Island College?

CHAIRPERSON CONSTANTINIDES: Uh-huh.

PROFESSOR GAYLORD OLSON: Oh, great. Okay, well [coughs] that—those are places that have quite a bit of large buildings and open spaces. For example soccer fields. Now, when I say seasonal storage what I mean is putting a—a horizontal array of pipes underground perhaps under a sports field or it could be under parking lot. Now that introduces a much better advantage for solar thermal collection because you get most of the solar thermal energy in June, July and August. If you're to use it for space heating, you’re going to need it in December and January and maybe even part of February [laughs] although it’s kind of warm today, but we think that it is going to be cost-effective to do that. Now, the part of the world where this has been done with great success on a large scale is Denmark. If you talk about solar technology in Denmark, you will have people tell you that is not solar electricity. They have large arrays of solar thermal collectors. They are storing that heat from summer into winter, and they’re using it for a large portion of space heating in homes, in—in towns and villages in Denmark. So, I’ll—I’ll just try to quickly go through some of the slides here, and there are links to it and, of course, I could send this to anybody who’s interested, but, one—one more thing. Do you all have a copy of my five-page handout? Could I steer you to the top of page 2. I have something there that has not been brought home yet today at this testimony, but I’d like to make sure it’s brought home. And that is when you talk about solar photovoltaic electricity, there’s a tremendous economy of scale. If you can get that electricity from a very large array on a big open field, rather than any rooftop.

And so, I think we're going to see this happening more and more because the electricity—well, but that's the number one point that I put there. The economy of scale. It's about a factor of two. In other words, you could buy twice as much electricity if it comes from a very large array on a big open field as you can form a rooftop. Point number two, the solar—this has been brought out already here. I'll just mention it quickly. You can easily transfer [coughs] that electricity over the power grid many hundreds of miles without any significant loss. Well, there would be some loss, but not much. You cannot do that with solar thermal. Point number three, which was brought out before also and I certainly concur, there is about a factor of four or five benefit and efficiency and conversion of sunlight into energy with solar thermal as compared to the currently used solar photovoltaic panels. So I'd like you all to think about those three points before you make any very—very much [coughs] of a decision into large dollar investments because I think these are important things to—to take into account. So, with that, I'll go through the—some of the slides here. I'm going to skip down quickly through these, but to open the door to something else which has not been brought out. Heat pumps and underground storage or underground heat exchange represent a very syner—synergistic set of technology elements. This has a very simple solar collection [coughs] method unglazed there, and I'm going to try to go quickly through these. With a heat pump you want to have a temperature that's compatible with the temperature you're trying to get inside your building. So if you can start with warm water, a heat pump will be very efficient. That's basically what that shows. This shows some of the dollar [coughs] benefits for—for doing this as the hybrid approach, solar thermal collection along with a heat pump, a water source heat pump. This is almost the same thing. Here is another type of solar thermal collector. This would be the evacuated tube type that Mike—Michael DiPaolo [coughs] was discussing and he represents a very predominant company. Here's something that could combine the three technologies solar thermal in the middle, a ground heat exchanger at the bottom and a water source heat pump at the top. If you have water valves that are computer controlled in that system you can now open—now have this system provide heat essentially all year long. In other words, the ground can be a seasonal storage this facility for you. So in the summer you can condition that ground with the solar thermal collection to make the ground heat exchanger very warm. In the winter that heat pump will operate much more efficiently because it can get hot water from underground even if the sun is not shining in December. I hope that makes sense. At any rate this—this could be a big advantage in the solar thermal direction basically and I have about nine different modes of operation here depending on which of those valves are open, and which are closed. This has a—an extra ground heat exchanger. So in this configuration, if you wanted to you could make one region underground hot all year long, make the other region underground cold all year long. And again, you have a solar thermal collector at the second block from the top. This is something more recently but it—it avoids much of the valves, but it uses multiple—variable speed pumps, and here again, we're—we're—we're showing a solar thermal collector in the middle and at the top one or more water source heat pumps. The dry cooler there is—it has a liquid heat exchanger. Hope there are some engineers in the group to pick this—pick this up here. The horizontal ground loop has a valve associated with it so that you can reverse the flow direction in the ground loop. So the idea is with a large horizontal array of pipes in the ground below an insulator that's the seasonal storage configuration. The ideal thing is to have a connection at the center, and a connection at the perimeter. So when during the summertime you want to put hot water into the center point of the underground storage region. In the winter when you want to bring that heat back again, you bring the heat out from the center. So you need to have the reversal of flow direction. The valve at the bottom right D2 would be open for flow when you want to configure or when you want to precondition the ground temperature either hot or cold. In the case of the solar thermal collection you would have water circulating counter clockwise so the hot water comes out the left side of the solar thermal block and it goes down. It goes into the ground, and circulates around. So you're continually heating up the ground all summer long, and then it'll—as long as it's big enough, it'll still be hot in December. But you—you probably would not do this on Manhattan Island because there is not a big enough area to do it, but you could do it at any of the colleges that I mentioned. So, this is kind of a side—simplified side view, and what this shows additionally is if you have a source of both hot water and cold water, you can generate electricity from—from that. Now, it may not be very high powered—high—high energy or high powered electricity for a long time, but it—it probably would be useful for an emergency situation. I'm going to skip through some of these because you can't read them very well, but okay. So underground there could be a spiral array of pipe such as sketched out here. It could also be put in a rectangular form to match the dimensions of the building. But this would be for new construction rather than an existing building. So I hope we have the door open here to any new buildings that the City might be constructing. So this would be a way to plan in advance for better use of solar thermal. Now, you have to have this underground region large enough to be capable of seasonal storage. When I say seasonal I mean for a storage for about six months from July into January basically. So what we're showing here is if we heat up a hemispheric or region of ground we're—we're asking how large does it have to be to really store efficiently on a seasonal basis, and we see the two extremes here on this graph if it's too small like four or five meters radius, you're going to lose 80% of heat over six months. So it has to be up in the ballpark of 15 meters radius so that you're able to store 80% of the hear over the six-month—when I say six month, I mean the heating time and the cooling time there on the—on the bottom right. For this the size matters when you want to do a seasonal storage of thermal energy underground. Now, there's a cost advantage compared to standard underground heat exchangers. The standard approach is on the far left here, which would be bore holes typically used with ground source heat pumps. An alternative is the horizontal array of pipes on the right here, and this is being done in the state of Maine for heat exchange not specifically heat storage. But there's a tremendous cost advantage compared to bore holes of doing this, and it's about a factor of two to three, and that shows up here. If you want to—if you compare the top line on this little spreadsheet, it gives you the cost per ton of—

of heating or cooling and it's $3,400. If you look at the horizontal grid second from the bottom, it's $1,100. That's a factor of three. Now there's one company that's doing the seasonal storage and they've done it for a long time, and it's in London, England, and anybody who wants can check their website out. You'll see the examples. They also store cold underground. Here's a picture of the storage array being put in the ground, which would be below a building. It can be below a highway or a parking lot. They've done this actually below a highway in England, and—and that works. [pause] One of the very successful seasonal storage and thermal collection systems in North America is this right here, which happens to be near Calgary in Alberta, Canada. So they have flat plate solar thermal collectors on all of the garage roofs for 52 free-standing homes, and they are putting hot water all summer long into this case they are using bore holes, 144 of them at the top right. It's been operating for about eight years, and it gives essentially 100% of their space heating for all of the homes. I'd recommend you check the website out. It turned out to be more expensive than is cost-effective but it—it works quite well. Here are some of the dollar amounts for that particular project. If you want to talk about seasonal storage and different methods this graph shows I think four different methods: Tank, pit, bore holes and aquifer. What we are proposing is yet another method, which would someday be—be on this graph and that is the horizontal pipe array buried in the ground below an insulator. But as you can—well, I won't dwell on this. It's little bit too much detail. When you—when you want to talk about solar thermal collectors, here is an—and important graph that shows the efficiency of the three major types of collectors that we could consider for New York City use, in my opinion. The evacuated tube type works at—at highest efficiency off to the right when you have a high temperature that you want to get to. You'll notice that the—the efficiency on the left goes up as high as 80 to 85%. Now, this graph does not show what happens when you get to the left of the zero point, but there is something interesting in that direction also. Oh, this—this is too small to read. Sorry about that. [background comments] Okay, this is in my handout. What this shows is that [coughs] if you have a solar thermal collector where the water in the collector is colder than the atmosphere, you can get a—an apparent efficiency, which is greater than 100%. Now, the reason that happens is because you're collecting thermal energy from the sun but that same collector can collect some thermal energy from a warm breeze that blows across. It's convection transfer. It's also radiation transfer. So, I'm going to kind of skip quickly through these so we have time for—for questions and-- In terms of temperature that these panels can get to this shows a temperature that is currently being shown on a website at the upper left of up to 200 degrees centigrade. So very hot. Okay, the—the last two slides I want to emphasize this one and the following one. This one opens the door to any and all buildings in New York City that have windows because this is a research project going on right now in—in Europe with—with multiple countries, and they're intending to have the windows become solar thermal collectors. [bell] There will be water flowing through a hollow space in the windows, and so in any and all skyscrapers in New York someday could have solar thermal collection from that method. The final slide here is something that a few of us are working on to have a solar thermal collector, which collects heat as a flat plate collector type, but also will collect cold from water flow through a top hollow surface. So, thanks for your attention. That's all I have right now.

CHAIRPERSON CONSTANTINIDES: Thank you, Professor Olson. I appreciate that. Thank you for your—your thorough Power Point presentation. I appreciate your testimony. So I'm—I'm going to ask a few questions, and—and the City, you know, the City agencies like DCAS and—and—and also maybe claim that between maintenance and installation that solar thermal is four times more expensive that photovoltaic, but are we making the wrong comparison? Should we be making the comparison to a boiler system, and replacing a boiler and the—the greenhouse effects that they—that that has, and—and sort of making that comparison instead. I mean that sort of popped out when you had sort of discussed your testimony early, Ms. Baldwin.

JESSICA BALDWIN: I'd—I'd love to answer the question.

CHAIRPERSON CONSTANTINIDES: Go ahead.

JESSICA BALDWIN: First of all, as far as your number the cost is two times as much. Solar thermal systems--

CHAIRPERSON CONSTANTINIDES: I heard a number but [laughs] but summers days, that's a possibility.

JESSICA BALDWIN: [interposing] I'm sorry. Were you finished with your question for the--

CHAIRPERSON CONSTANTINIDES: [interposing] No, that earlier that—earlier DCAS and then the Mayor's Office of Sustainability had said that the—that they had quoted that it was four times more expensive between installation and maintenance to install a solar thermal system rather than a solar PV. And I'm posing the question one, is that accurate and second, are we making the wrong comparison when we should be making the comparison as you talked about to a traditional boiler system, and how that breaks down and how—how we're paying for those particular boiler systems to be maintained.

JESSICA BALDWIN: Well, I can—I can go on that—the first statement about the cost comparison was not a question but a statement.

CHAIRPERSON CONSTANTINIDES: Right.

JESSICA BALDWIN: I can—I can just follow through with that. It is a little more expensive the initial installation like per square foot. Per energy produced solar thermal would be cheaper. I bid on both jobs, and I think some of us do so we know what the comparison is.

CHAIRPERSON CONSTANTINIDES: Uh-huh.

JESSICA BALDWIN: But in—in terms of not comparing solar thermal to PV and comparing it more to like a building mechanical system--

CHAIRPERSON CONSTANTINIDES: [interposing] Uh-huh.

JESSICA BALDWIN: --that would be a much more wise approach. I would absolutely encourage anyone to change their perspective on that.

CHAIRPERSON CONSTANTINIDES: And I—many of us—many of our buildings that, you know, we use the traditional boilers. There are boilers that break down to be replaced and they aren't hearing the larger problem.

JESSICA BALDWIN: [interposing] Yeah, right. In terms—in terms of maintenance and costs that's a better apples to apples comparison.

CHAIRPERSON CONSTANTINIDES: And going to a solar thermal system is not only going to be cost competitive when we make that same comparison but also we're going to be reducing greenhouse gas emissions.

JESSICA BALDWIN: Yeah.

CHAIRPERSON CONSTANTINIDES: And I see you want to jump in there. I saw waiting. (sic)

DOUG FALCONBERG: Yeah, I—I think the devil is in the details of the design and as an engineer I'm very focused on design issues, but I think it's—it's like—like everything else. If you compare that you go to the Mercedes which is going to be more reliable, but in terms of the design, we focus on designs that require less maintenance. We don't use Glycol because Glycol is a source of failure. It corrodes the pipes, it overheats. We use a drain back systems so when the system is not in use the water drains out to avoid freezing issues and overheating issues. I think it's the quality of the insulation. We've been called upon to replace the insulation on rooftops, but all the insulation burned off because guess what, they didn't use high temperature insulation, they used standard foam insulation, which simply melted and burned when the pipes got hot. The weather proofing a roof with the pipes. You know, you—you put on sheathing, the pipes don't corrode. You don't put on sheathing, they do. It's—it's a thousand little design details that again will add up to a system that's either maintenance prone or extremely reliable. You know, putting the strainers before the pumps so the—the pumps don't sit and try and pump grit and—and grime through their—through their wheels, but—but are pumping clean water. That will all will extend the life of the pumps, and on and on and on. There's like a zillion details, but I will say that if the system is properly designed as—as I think Quixonic stated they'll go for 25 or 30 years. I also want to correct another misstatement where somebody said that if a single tube breaks or—or fails, you have to shut down the system with evacuated tube systems, which is are more—are more expensive, but they produce more heat in the wintertime. With those you don't have to shut down the system. You simply unscrew the glass shield. You put on another one and you're—you're back in business. So there's a million little design issues that—that have to be addressed like any other system and if you address properly and the engineer does—does their job, you're going to come out with a very reliable and satisfactory system.

CHAIRPERSON CONSTANTINIDES: So then looking at—and we've talked a little about payback and building on payback. They said that the systems that were installed FDNY were payback—they're payback just wasn't worth it because of the lack of usage of water, and then secondly that the system was unreliable. So you—you'd make the case that really is about the design itself, and—and then sort of looking at paybacks that, you know, you'd talked about nursing homes, senior residences, residential buildings, hospitals, prisons, places where there's consistent hot water usage as—as better for solar thermal on the one floor?

DOUG FALCONBERG: Well, we do—we tend—we do commercial. We don't do a single-family residential. We multi-family residential and most of the installations we do there's an onsite building manager whether you call him a super or a building engineer, but there's someone in terms of—of available to either monitor the system or contact if—if weren't monitoring their system. So, you know, for—for that situation I—we—we saw the FDNY, and we know that in terms of what they were doing, which is basically washing dishes after the evening meal. There—there was no way that those firehouses required three or four panels. One panel is typically sufficient for a family of four living in the same unit. So from that standpoint in my opinion it was a poorly—the design was poorly conceived from the very beginning.

JESSICA BALDWIN: A system that's oversized is more likely to fail than a system that's undersized, which would actually operate more efficiently. It's a—it's a shame what happened. There needs to be more technical review and oversight and monitoring is critical.

CHAIRPERSON CONSTANTINIDES: Right.

DOUG FALCONBERG: Yeah because without monitoring the pumps will cascade and go into the stagnation. If a pump fails, it goes into stagnation, the water overheats, the Glycol breaks down. Now it starts corroding the pipes. You get pin holes, and all of a sudden you've got it with the insulation off—installation—insulation off the roof, and—and replace the pipes. So it's a combination of factors, but like any mechanical device or any system in general, if it's done properly, a year maintenance will be minimal. You have to change the oil in a car every 3,000 miles.

CHAIRPERSON CONSTANTINIDES: So it's about main—it's about doing it smartly, doing the design intelligently and—and finding the right building so it's appropriate--

DOUG FALCONBERG: Yes.

CHAIRPERSON CONSTANTINIDES: --and sizing the—sizing the system to the use. If we can do those four things, then we're—we're doing—we're on the right track.

DOUG FALCONBERG: I agree with that statement, yes.

CHAIRPERSON CONSTANTINIDES: Alright, so I—I can't take questions like one, two. [laughs] I'll have to have you come back to the microphone to do that. So I just want to thank you for your testimony and I appreciate your giving us your expertise and you—your time here.

PROFESSOR GAYLORD OLSON: Am I allowed to make one final comment?

CHAIRPERSON CONSTANTINIDES: One final comment definitely.

PROFESSOR GAYLORD OLSON: Okay. Anyway on the screen I have showing there the cost to put in a 10,000 square meter, solar thermal array in Denmark, which is fairly current. So it ends up being about 240 euros per square meter.

CHAIRPERSON CONSTANTINIDES: Good. Thank you Dr. Olson. I appreciate your time and—and all of your—your expertise and testimony. Thank you. [background comments] Alright, it will be next up please step forward Robert Kramer (sic), Alexander Weiss and Kartek Abernath (sic). [background comments, pause]

SAMARA SWANSTON: Excuse. Gentlemen, could you pleas raise your right hands.

CHAIRPERSON CONSTANTINIDES: Is Kramer here? Okay, thank you.

ROBERT KRAMER: Later I want to talk about--

SAMARA SWANSTON: [interposing] Can you please raise your right hand? Do you swear or affirm to tell the truth, the whole truth and nothing but the truth today?

ROBERT KRAMER: I do. I affirm. Okay. I want to thank the Council for having me speak.

SERGEANT-AT-ARMS: So make sure the red light is on. (sic)

ROBERT KRAMER: Oh, sorry.

CHAIRPERSON CONSTANTINIDES: Would you sit down and put on the mic. Oh, wonderful. Thank you.

ROBERT KRAMER: I want to thank the Council for letting me speak. I believe that we are—we're in North America and we only get—what is it 1,400? How many we get there.

ROBERT KRAMER: I'm—I'm showing 59 kilowatt hours.

ROBERT KRAMER: Okay. Even in North Africa, even they have solar there, they still have a boiler because the sun doesn't shine everyday, and they do want to make sure—if they want to have the hot or heat, they have to use a boiler. I believe that solar thermal is amazingly great, and I-I—I am pretty sure it would be very applicable to some buildings in New York City, but if you want to use it in commercial buildings it's quite difficult. They are not using like some of my previous speakers they pointed out. Hot water is not really used that much in those buildings, and many of these buildings are converting even to electric hot water heaters because there's not enough usage. On some larger buildings, putting in so many solar panels it's very difficult in New York, and because it's highly concentrated. I believe that solar panels can be used in some instances where the building or the area allows it, and it can be instrumental. But most of the time in New York City it's not so easy. We have existing systems. Our buildings that we have in New York City are built--most of them are over 60 years old. They are operating not on solar. They weren't built for solar panels. They were built for steam and hot water that's produced by boilers. If we would want to even implement some of the solar panels, which I'm not that familiar to do the whole city, you would not be able to meet those goals. What I believe we have to improve what we have to make the city work in North America, to be able to use the existing infrastructure that's already in those buildings. And for example the City of Manhattan our Borough of Manhattan has 106 miles of a heating system. The heating system continuously puts out 10 million pounds of steam every hour 24/7 all year round, and it’s not just steam, it’s clean water, a very valuable resource. That valuable resource is not used completely. Seventy percent of some of it is used, 32% immediately is dumped into the sewer as condensation on 1,952 steam tracks in our system, which pollute our—our sewer with—with thermal energy. As you know, if you’re in Manhattan you see steam rising from all over the streets. Not only that, this heat goes into steam, goes into the building, but they reduce its pressure and the air—and they use some of the heat and most of it is dumped into the sewer, but not at the temperatures of about over 200 degrees. They have to add cold water from the tap just to cool it down. When they’re cooling it down, they’re adding more water to the sewer and they’re taxing our water resources. Yes, oil is expensive, but water is something that we can’t just get out of the ground so easy. It’s a very expensive item. Maybe we take it too much for granted, and right now we’re not only throwing away water, we’re throwing away a lot of heat. The heat that’s being thrown away into the sewer system could heat the whole of Manhattan. Give us hot water at least for everyone for free without putting any solar panels anywhere and the infrastructure already exists. It's piping its hot water. We have developed the special system, a very simple system. It basically utilizes the existing infrastructure that we have. We make—we make sure we can make every boiler or Con Edison—any—any system you have in your home except that forced heat, which is something that's completely insane—insane to be used for heating. To be able to integrate. You can integrate the panels, you can integrate your boiler. You can use your gas or whatever it is and what it will basically do are converting hot water—you're heating hot water as a by-product in its conversion. We create electricity with it. So any time you heat water, you can electric as a by-product. That's something that can be utilized almost in every building here in New York and, of course, you can put all the panels you want anywhere you want, but the panel is not going to solve your problem. We're still in North America. As I said, anywhere else it's not—it's not going to work. Let's use what we have. For us to rebuild the whole system of New York City all the piping all the boilers, all the—all the infrastructure it's impossible. Even—even Trump don't have enough money to do it. So let's try to have what we have and try to make it do well, and use our energy fully. That's our biggest integration. All these new technologies, they're all wonderful, but you know what, most of it is very much bleeding technology, but because it's not easy. Like the gentleman said, to get that water to run by itself or—or—or to be heated and cooled down in the winter so it doesn't freeze or thermal loads on the cells, the solar cells are still not up to par. They're not to what we really need, and again, there's many other things we can do, but it's a lot of money for a kilowatt of energy. We already have an infrastructure. We can't just change it overnight. Let's use what we have the best there is. Let's make our systems very efficient and very integrated. Come to New York or any city in the United States our technology, our heating technology and our high technology dear Councilman is over 100 or 200 years old. We have not changed a bit. Nothing has changed at all. They do make the boilers in different packages. They make nice packages outside, but the boiler, the heating system has not changed one iota, and let's put it this way there is some condensing technology and so forth that yes, but compared to Europe, compared to Japan or even much more as it compares to—to China, China is much advanced than we are. We're throwing away money like it's beyond belief. What is happening right here in your buildings, New York City buildings. I have examined many of your buildings, and it's a complete waste, and you're not the only ones. You go down Broadway, there's so much money being thrown away. It's unbelievable. Not only that, the water is wasted, and actually I brought this project 20 some years ago to Con Edison. Con Edison made a plan with me and JV to implement to use this technology. We even have a patent together how to save all this energy, a joint patent our company with Con Edison. At the last moment the realized the way they structured it financially if they're going to save any money, they're not going to make more money. They make money for every dollar they spend, not for every dollar they save. The system is set up that way. So we have to find a way to make it very efficient to use the energy that we have. Yes, let's use some new technology, but for us here in Manhattan, we have to do whatever we have, and by the way, I am not just giving you another pretty face here and giving you another baloney speech. I do invite you to come to visit us. We are—we have an installation right here at 233 Broadway, the Woolworth Building. You're welcome to come. Our factory is located at 4402 23rd Street in—close to your district, Councilman. We make all our equipment ourselves completely because unfortunately all of the equipment you can't make, and you have to go to China to make it. We manufacture everything ourselves, and we're look forward to bring this product here to New York and to implement it, and not only that, financially speaking our products are very inexpensive. You know why? We believe in what we make. We're willing to do it as PPA. We're willing to put it into your building and we guarantee that we are—without you paying for it. It's on my dime. I'll install it myself. This is my work.

CHAIRPERSON CONSTANTINIDES: I'll look forward to seeing.

ROBERT KRAMER: Thank you.

CHAIRPERSON CONSTANTINIDES: I'll look forward to seeing it. Thank you for your testimony. Next up.

ROBERT KRAMER: Am I excused?

CHAIRPERSON CONSTANTINIDES: I'm going to probably ask questions, but can you stay?

ROBERT KRAMER: Okay, go ahead.

CHAIRPERSON CONSTANTINIDES: I want to hear—go through the whole panel first. Sir.

KARTEK GOANAT: First off, good afternoon and thank you for allowing me the time to testify today. My name is Karket Goanat (sp?) and I'm here to testify in support of Intro 1159 on behalf of the New York City Environmental Justice Alliance, or NEJA for short. Founded in 1991, NEJA is a non-profit citywide membership network linking grassroots organizations from low-income neighborhoods and communities of color in their struggle for environmental justice. NEJA empowers its member organizations to advocate for improved environmental conditions and against inequitable environmental burdens. Through our efforts member organization coalesce around specific common issues that threaten the ability of low-income and communities of color to thrive and coordinate campaigns designed to effect city and state policies including energy policies that directly affect these communities. Because the number of NEJA member organizations come from communities overburdened by greenhouse-- gas emissions and co-pollutants from power plants clustered in their neighborhood. Our organization is a key advocate for the city's emission reductions—reduction goals. NEJA was a member of the Building Technical Working Group that analyzed the potential greenhouse gas reduction pathways for the building sector and supports the goal of reducing emissions while achieving co-benefits such as increased public health and job creation and energy efficiency strategies, and the emerging renewable—renewable energy economy. Excuse me. NEJA comments the New York City Council's Committee on Environmental Protection for holding a hearing on Intro 1159, creating an opportunity for public comment on this important milestone. We support an amendment to the Administrative Code that requires feasibility studies on the cost of installing solar thermal energy systems on all buildings or structures owned by City agencies and departments. Furthermore, we support the requirement that all city-owned buildings install solar thermal energy systems where they are cost-effective. Through widespread installation of solar thermal systems in city buildings, the city will be taking a strong step towards reducing the overall energy demand from polluting sources. By extension reducing overall energy demand from these sources can have environmental health benefits in low-income communities and communities of color where older and more inefficient power plants have been historically clustered and caused disproportionate public health burdens. We also support the bill's public awareness campaign around the multiple benefits of installing solar—solar hot water systems. As we take bolder steps to reduce our carbon footprint, the city should guarantee protections for low-income neighborhoods and communities of color. We encourage solar installation feasibility studies include considerations for equity and access for low-income communities and communities of color. As solar thermal—thermal installations proceed, the city should partner with installer who commit to higher—hiring locally and providing fair wages to their workers. Parallel to any efforts in educating property owners on the benefits of using solar hot water systems, we need to create safeguards for rent stabilized and rents—rent regulated buildings to ensure that families are not priced out of their homes in communities through major capital improvements, and just energy policies central to NEJA work, and we look forward to a continued collaboration with the city to mitigate the threats of climate change. Thank you.

CHAIRPERSON CONSTANTINIDES: Thank you. Appreciate your testimony and look forward to the partnership. Thank. Mr. Alexander.(sic)

ALEXANDER WEISS: Good afternoon and thank you for giving me the opportunity to testify. My name is Alexander Weiss. I represent Green Apple Solar, LPD, and I'm a certified solar thermal installer. I'm also BPI certified in heating in multi-family building auditing and small homes auditing and envelope (sic) certified as well. Well, Barry Tarevi (sp?) way back in the '60s spoke about solar energy that it should be installed most—mostly in the southwest where there's plenty of sun, and then they would an net exporter of—of electricity. I've done a lot of research in—in—in—in the feasibility of it—of—of—of PV and-and—and solar thermal, and in my humble opinion and everybody has availability of the Internet to do their research.

Solar PV is—it works very well in the summertime. In the winter barely if at all. That’s just a fact. You can’t really fight the laws of physics as somebody else very eloquently pointed out. The angle of incidents and other things, it can be paired possibly with—if it’s—if it’s—it’ coupled with cooling systems to take advantage of the sun, the sun in the summertime. But solar thermal is--is a proven technology. It’s been around for quite a while. There are different kinds. There’s a flat plate and there’s the—and there’s evacuated tube. Again, the information is all out there that—that solar thermal is—I’m sorry, evacuated tube solar thermal is much more viable in—in this—this latitude. It’s about 41 something latitude, and wherever there’s a cold climate. Again, the laws of physics take over. It moves from hot to cold and never reverse the second law of physics, thermal dynamics, and—and a vacuum is much better insulated than—than anything else. So a flat plate and a collect works very well even better than perhaps an evacuated tube in the summertime. In the wintertime it’s a no contest. Some of the comments that were made over here I thought were a little bit laughable. Electrification of steam heating systems with—with PV I don't understand how that's possible given the—the nature of the infrastructure that we have in New York City. Most of the public buildings especially are 60, 70, 80 years old. They have large boilers with steam systems. What are you going to do? Are you going to rip that all out, and put in electric? It doesn't—it makes absolutely no sense to me. Maybe I'm missing something. I don't know. A lot of people mentioned and it's quite correct in my view that every case is—is—is—is different. The amount of hot water usage develops it—it—it is relative to the size of the—of the system design and even exact same buildings with different populations will have different water usage. So we have to really match the hot water usage, which you can determine fairly well from the—or at least you can get an idea by just, you know, reading the meter, the—the water meter and get an idea of how much water is being used by the building. Everything needs maintenance even the brick walls needs maintenance—maintenance. So I take exception to some of the comments that were made that say that—that solar hot water requires the high maintenance system. It's—it's not—in my view it's just incorrect. I have a few systems installed in Brooklyn. They require very little maintenance. The only—the only moving part is the motor, and the sensors are sometimes if they're not properly protected will burn out, and then it will cause a fault. But again, somebody else eloquently mentioned that, you know, we have monitoring systems, and everybody is connected to the Internet so we can monitor these things very easily and—and maintain them. Some of the systems that I have installed I have maintenance contracts where I maintain them, and I've also offered people I can train their own staff and maintenance people to maintain those. They're very simple to maintain. There are different ways to—to install them. One of the problems that a lot of the people that—that I've spoke to are concerned about leakage—leakage in the roof when you installed these systems. There are quite effective monitoring systems that are used, that can be used to—to—to make that less of a problem. One of the things that should be—in my view should be implemented with these public buildings or any building is the overall thermal efficiency of the building. If you want to reduce your thermal envelope or thermal load of—of the building, you can do it a number of different ways. The—the weatherization—I work for weatherization agencies, and one of the most cost-effective measures is simply insulating the roof. That makes a big difference, insulating the piping on the—on the steam that's existing. One of the—one of the uses of—of—of—of solar thermal, if you couple it with an—with an existing system, is you can increase the efficiency of the—of the tankless coil. If you're putting pre-heated water into the tankless coil, you lessen the number of times that the equistat will call for the boiler to come on, especially in the summer. And in the winter, it's also a factor because if you lower the temperature, if you—if you're pumping 40—40, you're pumping, you're—you're—it's coming into pressure in 40 degree water into the—into the—the-the boiler water. You're going to reduce the—the temperature, and if you're making steam at the same time, you're going to need a lot of energy to bring back that—to bring back that steam and to maintain pressure. It's well known fact it takes 972 BTUs per pound to convert from 212 to steam. So that's a big number. Maintenance, of course, if you—if you—if you lessen the amount of times that the boiler comes on, you will—you will reduce the maintenance. Somebody also mentioned the design, design, design. If it's properly installed, properly designed, the system will work very well with little or no maintenance. That's all I have to say. Thank your for the opportunity.

CHAIRPERSON CONSTANTINIDES: I want to thank each and every one of you for your testimony, and your time today. I appreciate your efforts, and your time to come and comment on this legislation, and your partnership in making our city greener and more sustainable. So I look forward to meeting with each of you and—and speaking more thoroughly on this topic. So thank you.

ALEXANDER WEISS: Thank you. [background comments]

CHAIRPERSON CONSTANTINIDES: Alright, Josh Kellerman from ALIGN. Are you still in the room, Josh, and Gary Goth, DC37 Retirees Association. Are either of you still in the room? [background comments] Okay, great. [pause] Great.

SAMARA 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?

I do.

CHAIRPERSON CONSTANTINIDES: Alright, go ahead.

Okay.

CHAIRPERSON CONSTANTINIDES: Thank you.

You sure nobody else wants to join me. [laughs] Your—your compatriot left early so-[laughs]

CHAIRPERSON CONSTANTINIDES: It’s the final panel that—that they couldn’t wait us out.

JOSH KELLERMAN: Alright, thank you. Thank you for the opportunity to testify today. My name is Josh Kellerman. I work at ALIGN. The ALIGN is for a greater New York. ALIGN is a community labor coalition dedicated to creating good jobs, vibrant communities and an accountable democracy for all New Yorkers. I’m here to testify in support of Intro 1159. ALIGN supports this bill because we believe that the city must act boldly and quickly to address the threat of climate change. Natural gas and fuel oil account for a significant portion of carbon emissions from city-owned buildings and on site city buildings burn fossil fuel primarily for heat and hot water. Thus, finding alternative sources for heating hot water is key to reducing our carbon emissions and accordingly we support an assessment of all city-owned buildings to determine the feasibility and cost-effectiveness of this technology. Of course we're need an all hands deck plan to address climate change [coughs]. Thus solar water heating should be assessed and implemented where feasible. One thing I want to point out is it seems that there—at this point there's no overall assessment that takes into account all of the competing potential rooftop uses such as solar PV, solar thermal, green roofs, playgrounds, and creates a plan for obtaining all of these beneficial uses across the city through a comprehensive citywide plan. So I'm curious sort of at this point. If we find that there is a beneficial use or potential use that's cost-effective for solar thermal on a building, but there's also the opportunity for solar PV, who makes the decision about what is implemented, and is there a need to have some sort of advisory group maybe that I can help to think through those uses that has the interests of all of these competing interests in mind. [coughs] In addition, if the city's solar PV installations have been any—any indication we need to be paying more attention to appropriate workforce development opportunities that will—will ensure that we create good jobs for local disadvantaged residents. [coughs] When the city installed on 24 public schools over the last few years using capital funds, our—our research uncovered that only one union shop was utilized on five of those schools. There also was no comprehensive Workforce Development program in place to ensure that low-income communities of color had the first crack at those jobs. Changes are currently being made to the Solar PV program so that future installations create good local jobs and we commend the city and the Council for making sure that happened, but we hope that in the solar thermal installations on public buildings can avoid these hiccups out of the start gate. We also want to note that although all buildings in the city need to eventually have some form of on-site renewable energy, we should prioritize Environmental Justice communities for the first installations This will ensure that those communities who had suffered—who have suffered the brunt of an environmental pollution are the first to be relieved of this burden. Working with the New York City Environmental Justice Alliance, we are developing criteria that can be used alongside current site selection criteria to ensure that this is a program that tackles climate change and inequality at the same time. Finally, I want to note that how these projects get financed is a very important consideration. Reducing energy use should save the city money not just reduce emissions. The—the city currently uses two primary types of financing, which you all are very familiar with, power purchase agreements and capital funding. In determining which path to take, the city should take into account several considerations including whether we want to prioritize public energy, whether we get the best bang for our buck when we use private financing and whether an appropriate cost benefit analysis is used to determine when—which financing source we use. All tolled, we suggest the city emphasize public ownership and capital funding for this work as it is a better tool for saving the city money over the long run, and capital funding allows the city to more effectively set the terms of employment leading to better outcomes addressing inequality. I will note that there are other considerations when you use capital funding that that funding is now no longer available for other capital funding needs. So this needs to be sort of all put into a really sold cost benefit analysis, and what we've seen out of DCAS is they do have a cost benefit analysis, but we think it's inadequate in addressing all of these concerns together. So we look forward to working with you to find the best solution for all of this.

CHAIRPERSON CONSTANTINIDES: Fantast comments. Thank you so much as always, and thank you for everyone at ALIGN for your great work. Thank you. Alright, seeing no other testimony, I will first thank or committee staff. I want to thank Samara Swanston our great legislative attorney who always does a great job, our Policy Analyst Bill Murray, both of which are indispensable to this committee and get so much great work done. So thank you both for your strong, strong efforts on behalf of the city and the environment. Of course, our—our Finance Analyst John Seltzer and on my staff my Legislative Counsel Nick Rosowski (sp?)and Legislative Staff John Benjamin. I just want to thank everyone who testified today. We appreciate your efforts. New York City, as I said before, to reach 80 x 50 we have to deal with city-owned buildings, we have to deal with buildings over a million—over a million buildings in our city stock. We have to do better, and looking at all technologies whether that's solar PV, whether that's solar thermal, geothermal, biofuel, wind, hydro. We're going to continue as a committee to explore every opportunity for us to green our communities, and when it comes to Environmental Justice communities, we will fight even harder to make sure that historic uses in those communities are mitigated. So, with that, I thank everyone who testified today for your great efforts and looking forward to partnering and getting this done, and with that, we'll close this committee hearing. [gavel]

# C E R T I F I C A T E

World Wide Dictation certifies that the foregoing transcript is a true and accurate record of the proceedings. We further certify that there is no relation to any of the parties to this action by blood or marriage, and that there is interest in the outcome of this matter.


Date March 11, 2017