CITY COUNCIL
CITY OF NEW YORK

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TRANSCRIPT OF THE MINUTES

Of the

COMMITTEE ON ENVIRONMENTAL PROTECTION

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HELD AT: 250 Broadway – Committee Rm.
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B E F O R E: COSTA G. CONSTANTINIDES
Chairperson

COUNCIL MEMBERS: Rafael L. Espinal, Jr.
Stephen T. Levin
Carlos Menchaca
Donovan J. Richards
Eric A. UIrich
Kalman Yeger

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

David Suriol, Vordex Bladeless, Spain
(Appearing via Skype)

John Lee, Deputy Director & NY State Architect
Buildings and Energy Efficiency
New York City Mayor's Office of Sustainability

Allen Price, Director
Office of Technical Certification and Research
New York City Department of Buildings, DOB

Anthony Fiore, Deputy Commissioner/Energy Management
Department of Citywide Administrative Services, DCAS

Daniel Farb, Patent Holder on Wind Turbines

Eric Weber, Master Mariner, McAllister Towing

Will Buchanan, Energy Wall

Paul Schneider, Vice President, Marketing
CGE Energy, Michigan (Appearing via Skype)

Gary Westerholm, Chairman
CGE Energy, Michigan (Appearing via Skype)

Bryan Zaplitny, President and CEO
CGE Energy, Michigan (Appearing via Skype)

Bob Wyman

Ryan Chavez Infrastructure Coordinator,
Sunset Park, Brooklyn

Lisa DiCaprio, Professor Social Sciences
New York University, NYU

Paula Spear, Member of 350 Brooklyn

Ian Brownstein, Ph.D. Candidate
Mechanical Engineering, Stanford University

Kartik Abernathy, Environmental Justice Alliance

Lin Jo, Co-founder, United for Action Also Appearing for: Katherine Skopic, United for Action

[sound check, pause][background comments] [gavel]

CHAIRPERSON CONSTANTINIDES: Alright, good afternoon, and welcome. I am Council Member Costa Constantinides, Chair of the Environmental Protection Committee. I want to thank and recognize my colleague Peter Koo, also from Queens who is here today, and has a bill on the agenda. As this is the committee's first hearing of the new session, it's good to be back as Chair of the Environmental Protection Committee. I'd like to take this opportunity to welcome all the returning and new Council members to the committee. I look forward to working with everyone over the next four years to make our city more green and more sustainable. I especially want to thank our Speaker Corey Johnson for his leadership on the environment. I look forward to four years of productive work, and look forward to working with the Administration as well on the big things that we need to get done to meet the 80 x 50 mandate. Our hearing today focuses on wind energy technology applications and legislation to enhance greater use of renewable wind energy particularly in urban areas. We will also hear

legislation that requires implementation of energy efficiency measures. In 2014, we enacted Local Law 66 of 2014, which calls for an 80% reduction in citywide emissions by 2050 the 80 x 50 bill. To reduce our citywide emissions that dramatically, we must work aggressively to replace greenhouse gas emitting fossil fuels with a comprehensive combination of sources of renewable energy whenever possible. The five main sources of renewable energy are biomass, geothermal, hydro power, solar and wind. Together these renewable energy sources have grown to comprise 10% of the U.S. energy consumption as of 2016. The city has yes to—yet to include on-shore wind power as part of its plan to meet its 80 x 50 targets. Wind energy projects are currently in the massive--[background comments]—nascent state of development. That does not mean that these projects are not a worthwhile venture for the city. Several wind projects have already started in the city with enthusiasm for more. New small turbine technologies are emerging that could make residential wind power more feasible. Streamlining city regulations would make wind power more accessible and less arduous option for city residents and businesses. Also, the

city could enact and implement a strategy to assess its capacity for on-shore wind and energy along our city's waterfronts in order to create more informed decision making on wind energy potential in the city's plan for renewable energy expansion. Wind technologies do not discharge any wastewater or produce any solid waste while creating electricity. Wind technologies also do not produce greenhouse gas emissions. As these technologies do not create any air—air pollution there are substantial environmental benefits from employing wind technologies in New York City where air equality has such a large impact on respiratory and cardio pulmonary disease. There is no way to achieve our aims of good environmental quality and abundant energy for our lifestyles with continued fossil fuel use. The future of energy use in America is renewable energy, and this must include wind power. The American Wind Energy Association projects that if wind energy project installation increases by 3 gigawatts to 16 gigawatts per year, we could obtain 20% of our energy from wind by 2030. That kind of—that kind of commitment to wind would result in 600,000 new jobs, reduce 825 million tons of carbon dioxide and avoid $43 billion in indirect

costs to society like health related illnesses or fatalities. To achieve these benefits we will need to make changes and remove impediments. First I want to thank and welcome back our Council staff today, Samara Swanston our great Environmental Protection attorney. Thank you Samara for your great years of service [applause] and Nadia Johnson our Policy Analyst. Looking forward to working with both of you and the committee. [applause] And with that, I will turn it over to our—my colleague Peter Koo for an opening statement on his bill.

COUNCIL MEMBER KOO: Thank you. Thank you Chair Constantinides for hosting today's hearing. Thank you for your leadership in terms of protecting our environment and potential of our energy sources. Today, we are discussing Intro 96 in relation to allowing residential cooperatives to consolidate required energy efficiency requirements. In 2009, the city passed Local Law 87, which requires certain large buildings to audit their energy consumption and to submit energy efficiency reports. Those energy efficiency reports document any actions taken for the buildings to come into compliance. As we know, many residential cooperatives have multiple buildings on

multiple tax lots. Under the current law, each tax lot has its own deadline, which—with which it must make its own report. This legislation will allow the energy efficiency reports of all tax lots within a development to be submitted together rather than individually year after year. Not only would this ease the burden of residents co-ops, which are tasked with performing these necessary audits and reports, but it will also present a more universal picture of the entire development's energy efficiency. Thank you, Chair.

CHAIRPERSON CONSTANTINIDES: Thank you, Council Member Koo. So, before we hear from the administration, we will do something a little bit different. We have a wind technology expert joining us via Skype from six hours ahead of us in Spain. Please welcome David Suriol from Vortex Bladeless. Mr. Suriol. [applause]

DAVID SURIOL: Thank you very much, and the group (sic) off from my view. New York is a city that I love really. So, I am—I am in New York City probably four or five times a year. Okay. I would like to share with you a presentation. Okay. [background comments] Can you?

CHAIRPERSON CONSTANTINIDES: We can see it.

DAVID SURIOL: Okay, do you—wait, do you see the screen?

CHAIRPERSON CONSTANTINIDES: We do.

DAVID SURIOL: Okay. Okay, I will explain to you what is Vortex. Vortex is a technology that we are developing since 2012-2013, and as a friend of mine that lives in New Jersey told me that the great ideas require some patience. Okay. So, we are close to finish the development, but we don't have the product to offer you. Okay. So, I would like you to explain—I would like to explain to you how this technology works to understand how wind power can work in residents—the roofs of a city like New York, and how we are different of the conventional. We do lines that every—everyone knows with three blades running very fast. Okay, so what we are doing right now is what we call the solar panel of the wind power. What does it mean? You can use solar panel for water purifications thinking in this type of applications that you need only one watt or you can use solar panels also for utility scale to power a plant of megawatts. With conventional with

two lines of wind power, it's normally used for utility scale, and not for residential areas. You have small winter lines but they are not used well, and they are not machines that normally are used to urban or residential areas. What we are doing is the—the part of technology that will be used primarily for residential areas and just the reputation (sic) we can. Because the first product that we are going to launch it will produce 5 watts probably, and we will start to scale from this. But let me explain you very brief and very fast how is the principles of the technology. It is at the Tacoma Narrows Bridge from Washington State in 1940. This is not an exercise in exaggerations. This I mean it's happening. So, the wind force and some physical effects produced these movements, and this oscillation in the end that bridge fall down. My partner David Yanez, the inventor of the technology said: Okay, if this is happening to the bridge that also it's happening to many structures because the vortex setting, in fact, the vortex, in fact is a vortex of the peers behind the structures when the big—the wind goes through that structure. Okay, if it happens and also it's happening to the columns of

the conventional wind turbines, why don't we think of a different way to produce energy? Okay, and so, and this we have to talk here not only with a vortex setting, we have to talk also about the resident effect. So, if an opera singer is signing and breaking the cup, it's because the tone of voice is in the same level as the rest of—the—so the reason the resident is breaking the cup, okay. But what happened if I change the tone of voice or I put wine in the cup that we are not going to break this. This is the second principle that we are working on this prototype and this technology, sorry.

CHAIRPERSON CONSTANTINIDES: Mr. Suriol--

DAVID SURIOL: [interposing] Okay, so this--

CHAIRPERSON CONSTANTINIDES: --we're having—your PowerPoint--

DAVID SURIOL: [interposing] Yes.

CHAIRPERSON CONSTANTINIDES: --is not coming across. It's—we see the screen, but it's not changing with your speech.

DAVID SURIOL: Okay. Is it changing now?

CHAIRPERSON CONSTANTINIDES: Oh, we still see just saying Vortex Bladeless. We don't see the

individual slides that are coming up. Okay, now it's starting to change.

DAVID SURIOL: Okay. Do you see now reams—do you see now reams of paper. You are going to be there.

SAMARA SWANSTON: Okay.

CHAIRPERSON CONSTANTINIDES: Yes, we see that.

DAVID SURIOL: Is it white? (sic)

CHAIRPERSON CONSTANTINIDES: Uh-hm.

DAVID SURIOL: I—you don't see it all then?

CHAIRPERSON CONSTANTINIDES: I didn't--

DAVID SURIOL: [interposing] You didn't see the reviews?

CHAIRPERSON CONSTANTINIDES: I see the—I see the—the for different parts of the screen. Yes.

SAMARA SWANSTON: However, we didn't see Tacoma Narrows.

CITY CLERK: Tacoma Narrows we never saw.

DAVID SURIOL: [interposing] You only see this slide? Okay. Let me—so if you see this, it's okay.

CHAIRPERSON CONSTANTINIDES: Okay.

DAVID SURIOL: So, let me explain to you. Okay, so, the years that we have been working since 2014, ’14, ’15, ’16, we have been working on three different technical milestones. The first one is the geometry. The geometry is very important because when you have a link, you have to harbor the energy from the wind, and it directly—be taken directly off the geometry, but we start to develop different geometries, okay, that one, that one, that one. So, this is—those are the devices that we have investing only the—the geometry. Also, that one and this is a part to tie that we produce some energy. We have every thing here. Okay, and this is the last one. So, at the—at the end of—it was in 2017 we got the geometry, we patent, we made a patent over this geometry and this is—this was the first to come and then come the last one. The second technical milestone is related with the residents effect. If the wind changes normally, you know, wind to run, they produce energy. Okay, because they don’t have a resident effect, but as we have resident effect, if the wind changes, we need to change the natural frequency of oscillation. It means that when the wind starts to move our mass that is around three

meters per second, that's a normal wind in a residential area, we start to oscillate, and we are keeping oscillating until nine meters per second right now. That means that if you are in New York, the wind operates in New York probably it's around six meters per second, five or six meters per second. So, we produce energy, and if the wind changes to nine meters per second, we keep moving and oscillating and producing energy. And the third technical milestone that is the—the goal that we are trying to achieve right now is to produce enough energy with the alternator that we are producing to say that the technology is feasible. Okay, and we hope to achieve this goal along 2018. I think you have a presentation that I sent to Samara, and where I—we say that--

CHAIRPERSON CONSTANTINIDES: .Uh-hm.

DAVID SURIOL: --if we go into 2018, we will be in the market between 2018 and 2020. Okay, those pictures are prototypes that we are using right now in the field test. They are reasonable. The goal is produce from 3 to 5 watts. It doesn't—it's not really a good power to—for a New York City. This is—it only works for industrial applications and it's

not a big amount of energy, but the next—the next—so, the first product, real product that we want to launch will be 100 watts. That is similar to a small solar panel. So, if in New York you put a solar panel on the roof, you have a solar panel like in this picture. Let me show you. You have a solar panel on the roof. Then you have a vortex. You—you are producing energy from two different sources: sun and wind. So, during the night you have more wind than during the day. The—I think that's [bell] these technologies that really don't make any noise, okay because we don't get in gear or a moving part in contact. So, it's absolutely silent. We don't have—as we don't have gears, we don't need to change any oil in the maintenance goes almost to zero, and the cost of—the levelized cost of energy that these—how much it costs to produce energy with a device like this it will be close or below a solar panel. Okay. The applications are not only for homes, are all—are all support, as I said induce the applications like street lights or things like that. Now, we are producing, as I said, around the line—the blue line is the Vortex. We are around 2 watts. Okay, we have one alternator. We put two rows of magnets in and

two alternators—alternators in the same device, but we think we are able to produce the 5 watts we are looking for, and well, I think—well this is a team, this is our Advisory Board and we have been in contact for—from many companies and many universities that on the work, and what—do you have questions, please?

CHAIRPERSON CONSTANTINIDES: Is this—is this technology you're looking for the 100 watts application at sometime--it's later on this year, correct?

DAVID SURIOL: Yes, but as—as a—as industrial—I'm sorry. As a pre-commercial, okay.

CHAIRPERSON CONSTANTINIDES: Right.

DAVID SURIOL: The 100 watts we will have the guides for testing at the end of this year. 2019 is going to be the year to industrialize and start producing more units to roll to market. And I understand that to go to the United States the regulation is strong as it is in many countries. So, we will need to work on that kind of regulations in every country before we think we can offer this to the market.

CHAIRPERSON CONSTANTINIDES: Alright, so you'd have to look at not only New York City regulations but federal and state regulations as well.

DAVID SURIOL: Well, as you know, we are in Spain and the regulations in the United States you have federal regulations, you have city regulations, and we have to—to study a little bit more about the regulations in the United States because we are more focused now developing the technology than thinking in the regulations.

CHAIRPERSON CONSTANTINIDES: So, it—but this is setting the stage for wind power that's not the traditional, you know, almost like the blade. This is—this is bladeless. We're looking at a totally new type of technology coming down the pipe in the next five years from wind.

DAVID SURIOL: Absolutely, and talking about regulations for a new technology, as we can think, it's not—I think it's not going to be easy because when you go to regulations they're talking about three blades. We are talking about existing technologies and these are not existing technologies.

So, yeah, the next new year to apply these, we think this is going to be solved.

CHAIRPERSON CONSTANTINIDES: Alright, Mr. Suriol, thank you, sir. I can't take questions from the crowd. I'm sorry. I can't do that. So, I want to thank you for your time. Thank you for your presentation, and I look forward that when you do come to New York City to sitting down with you and—and discussing how we can move forward.

DAVID SURIOL: Okay, thank you very much.

CHAIRPERSON CONSTANTINIDES: Thank you. [applause] [background comments] Alright, so, with that I'll—I'll call the administration to the table for their testimony, please. I will call you, sir. We are joined by Council Member Rafael Espinal from Brooklyn. We're also joined by Council Member Eric Ulrich from Queens. [pause] So, Samara will swear you in.

LEGAL COUNSEL SWANSTON: Would you please raise your right hands. Do you swear of affirm to tell the truth, the whole truth and nothing but the truth today?

I do.

CHAIRPERSON CONSTANTINIDES: Alright, if you can just introduce yourselves and then go from there, that would be great.

JOHN LEE: Good afternoon Char Constantinides and members of the committee. I am John Lee, Deputy Director for Buildings and Energy Efficiency at the New York City Mayor's Office of Sustainability, and I am a registered architect in the State of New York. I am joined today to my far left by Allen Price, Director of the Office of Technical Certification and Research at the New York City Department of Buildings, or DOB, and to my immediate left Anthony Fiore, Deputy Commissioner of Energy Management at the Department of Citywide Administrative Services. Thank you for the opportunity to testify today on the following bills: Introduction 48 in relation to the creation of wind maps demonstrating wind energy generation potential within the city. Intro 50 to ament the New York City Noise Control Code of the Administrative Code of the City of New York and the New York City Building Code in relation to small wind turbines. Introduction 598 in relation to green energy to amend the Administrative Code of the City of New York to

require that all city-owned buildings be powered by green energy sources by 2050, and Introduction 96 to amend the Administrative Code of the City of New York in relation to allowing residential cooperatives to consolidate required energy efficiency reports. Climate change is perhaps the toughest challenge New York City will face in the coming decades. The goal of dependence on fossil fuels and the unprecedented scale of greenhouse gas emissions or GHG emissions have led to increasing temperatures and precipitation, rising sea levels and more frequent and intense flooding that threaten our community's health and economies. While President Trump continues to advocate American leadership on climate change, we were in New York City are hastening our shift towards clean energy by taking direct action to reduce fossil fuels and GHG emissions. For example, in May 2017, Mayor de Blasio signed Executive Order No. 26 committing New York City to the principles of the Paris Climate Agreement directing city agencies to align our work with the agreement's goals to limit global warming to 1.5 degrees Celsius. In January of this year the Mayor and our Comptroller announced the city would be taking the fight straight to the fossil

fuel industry by seeking damages for the investments necessary to protect New Yorkers from the impacts of climate change, and divesting our pension funds from fossil fuel reserves. The leadership on climate change from our City Council has also been admirable setting the pace for cities across the world. For instance, Buildings Mandate introduced by the Council last yare are bold and necessary steps to not only dramatically cut GHGs to help hold global temperature increases to just 1.5 degrees Celsius, but will also support the livelihoods of our residents by spurring thousands of green jobs. We are grateful for your partnership, and our collective effort to fight climate change we look forward to working with you to pass the mandates this year. Today's introductory bills align with the administration's climate goals, and so we are pleased to testify in general support of them. In order to meet our goal of 80% greenhouse gas reduction by 2050 or 80 x 50, we must make a significant shift to cleaner or choose the production. Today, only about 6% of the electricity feeding New York City's grid is generated from renewable sources such as wind, solar and hydro. So, we have to continue to harness the power of the sun

and the winds at the level of the utilities, and ono the roofs of our homes and work places. To reach our clean energy targets, the city has set an ambitious target of 1,000 megawatt solar power citywide by 2030. Wind turbines also have a role to play in this strategy as we have to take every opportunity to displace fossil fuel energy. With respect to Introduction 48, the bill requires the city to periodically conduct a wind resource assessment. Given the drop in prices for photovoltaics and the more favorable power production capacity of solar photovoltaics as compared to small wind turbines, most of the recent clean energy opportunities on roof—rooftops have favored solar projects. However, not every site is ideal for solar power production, and opportunities to extract power—wind power at small scale have already been proven. With limited space in dense urban areas like New York City, this bill will help us identify and map areas of high potential for certain types of wind--building mounted wind turbines. When mounted on the rooftops of our homes and businesses, the noise and vibration nuisances from wind turbines are particularly challenging to control from an engineering

perspective. Introduction 50 establishes acoustic performance in safety standards for building mounted small wind turbines. We strongly support the codification of standards related to building mounted wind turbines. In 2011, the Department of City Planning and the City Council revised the Zoning Resolution to clarify the land use requirements for rooftop mounted wind turbines. Furthermore, in 2011, the Department of Buildings published a Buildings Bulletin that provides guidance in the industry and a referenced Standard IEC 6100 to ensure the safe installation of small wind turbines. The guidelines include procedures for returning—obtaining approvals and permits for building mounted wind turbines as administered—as administered by department's Office of Technical Certification and Research. The standards proposed by Introduction 50 differ from those already published in the Building's bulletin, but these differences are minor and could certainly be reconciled. The administration and the Department of Buildings looks forward to working with the City Council to resolve the Technical Standards, and ultimately codify these very important regulations that will ensure the safe installation of clean

energy production. With regard to Introduction 598 requiring that city-owned buildings be powered green energy sources by 2050, we agree with the spirit of this bill. It is important to set targets of a bold and visionary. For example, where the city has direct control over energy supply, it has already begun to take action. The city will have installed 39.14 megawatts of solar panels on city assets by the end of 2019 enough to power 131,269 homes. In addition, the city has been actively assessing and installing other alternative clean energy technologies, including fuel cells, battery storage systems, building integrative photovoltaics, wind, geothermal and solar thermal systems. The administration looks forward to working with this Council on the details of this proposal and sketching on the path achieving the ultimate aim of these bills in the broader suite of climate change mitigation integrations, the Administration and the Council are progressing. Finally, we support Introduction 96 as efforts to streamline the submission process of energy efficiency reports. There are few technical edits that we will offer in order to ensure that DOB can properly enforce more compliance. In conclusion,

please allow me to applaud the Council's leadership on combatting the impacts of climate change to New York City. Working together, we are confident that we can strength these bills to help us achieve our 80 x 50 goals and uphold our part to limit global temperature rise to 1.5 degrees Celsius. Thank you for this opportunity to testify. I'm happy and my colleagues to answer any questions that you may have at his time.

CHAIRPERSON CONSTANTINIDES: Thank you, John for your testimony, and I, too, value the work that we've done together. This committee has in the last year passed 16 bills. So, I look forward to continuing that and continuing our partnership to make our city green and more sustainable.

JOHN LEE: Likewise, Chair.

CHAIRPERSON CONSTANTINIDES: So, that said, let's talk a little bit about wind. [laughter] There are so many jokes there, with me being elected officials right, but I'll—I'll refrain. How does the city assess unsure wind potential at NYC?

JOHN LEE: Largely it is a site-specific assessment. The—the kinds of resources that are proposed by Introduction 48 are the exact kind of

media resources needed to make the short-term feasibility analyses to understand the efficacy on making the site. Off point, though, it will come down to the site-specific analysis, and that is generally how it was conducted today.

CHAIRPERSON CONSTANTINIDES: Have we ever looked different waterfronts to see what the potentials for wind power generation are so far, and this really one thing we really haven't. It's rally more site-specific like you said, and it brings it to the table more than us looking for it.

JOHN LEE: This certainly does bring it to the table more than we have looked at it in the past.

CHAIRPERSON CONSTANTINIDES: Alright. How many wind—utility scale wind turbine permits have been granted by the Department of Building—Buildings in the last year?

JOHN LEE: I will defer this question to Allen Price from the Department of Buildings.

ALLEN PRICE: Actually, there have been no utility scale installations that have been approved by the Department of Buildings. We have approved one large mast mounted wind turbine that

could approach utility scale size, but that was not for a utility.

CHAIRPERSON CONSTANTINIDES: Great to hear. How many residential scale permits have been granted?

ALLEN PRICE: We do not capture that information on that granular of a level. However, anecdotally we are aware of about seven installations, small wind turbine installations that have—that are currently operating. So, they're currently going, not per year. It's like seven total?

ALLEN PRICE: Yes.

CHAIRPERSON CONSTANTINIDES: Okay, how many are currently—applications are currently in—in the process?

ALLEN PRICE: The applicants are not required to indicate on their applications if a wind turbine is being installed. At that information that we cannot capture the way these applications are filled out currently.

CHAIRPERSON CONSTANTINIDES: Okay. So, how do we—when it comes to solar—for solar they do it?

ALLEN PRICE: For solar yes.

CHAIRPERSON CONSTANTINIDES: Okay. I know that we have our new sort of subset of the—of the Department of Buildings coming forth. The—the, and so the—I'm trying to think of the—the term. I'm like--

ALLEN PRICE: [interposing] The Office of Alternative Energy, I believe.

CHAIRPERSON CONSTANTINIDES: Yes, yes. How would we make sure that wind—I know it's on the tip—it's on the tip of my tongue. Thank you, Paul. [laughs] How would we ensure that those applying for wind turbines would be able to sort of get help through that now subset of DOB if we're not requiring them to sort of click that they're wind turbine project?

ALLEN PRICE: Well, currently the—any wind turbine that is being proposed for installation is an as-of-right product. It can be used as along as the wind turbine meets the established criteria that we have published in our Buildings Bulletin. That criteria is clearly published in the bulleting.

CHAIRPERSON CONSTANTINIDES: Uh-hm.

ALLEN PRICE: Probably the main hurdle there is that the equipment must be listed to a standard that we have decided meets all of our safety concerns. If a wind turbine can meet not only the listing, but a few other requirements that we have in the bulletin such as maintenance, inspection, things like that--

CHAIRPERSON CONSTANTINIDES: [interposing] Uh-hm.

ALLEN PRICE: --that bulletin—that wind turbine may be used in the city of New York. Of course, as with any installation, it has to be approved and permitted at the Department of Buildings.

CHAIRPERSON CONSTANTINIDES: How long do the departments take on average?

ALLEN PRICE: For our first review of giving an evaluation, three days.

CHAIRPERSON CONSTANTINIDES: Okay.

ALLEN PRICE: We have mandated it to complete our first reunion (sic) and evaluation within three business days.

CHAIRPERSON CONSTANTINIDES: Okay and how about start to finish? How long does it usually take

to sort of—from the time someone puts forth their application to the time they're able to get all of their permits and get working, how long does that take usually?

ALLEN PRICE: So, part of that is up to the applicant. That first review will identify many of the objections that we have including outstanding information. As long as the applicant can get that information back to us in a timely manner, we will be able to approve as quickly as possible.

CHAIRPERSON CONSTANTINIDES: So, we're looking to make this as easy as we can, right? Because I know right now I mean I think I've said this about a thousand times already. So, I'm sorry you have to hear it again, but when someone wants to do traditional, you know, fossil fuel based projects, you know, it's pretty simple. They know the standard. They go get a boiler, they get their permits, they put it in. For alternative energy, we want to try to make it that simple, right, so people aren't looking weighing out time and money. Is it any more expensive or any more complicated to get any of these alternative renewable energy projects done than a traditional project?

ALLEN PRICE: Well, looking at a wind turbine installation compared to other alternative energy installations, this is perhaps the—the quickest process that we have in place for approval of an—of an installation. I—I'm not aware of anything that we could remove from the process to make it quicker. This is extremely streamlined at the moment.

CHAIRPERSON CONSTANTINIDES: Okay. How many wind projects in New York City have received grants from those surveyed for a small wind turbine program?

JOHN LEE: Unfortunately I'm not—I don't think we are in a position to answer on behalf of our survey. We can certainly inquire with our colleagues there and return to you with that—with that response.

CHAIRPERSON CONSTANTINIDES: Alright, do you guys have any questions?

COUNCIL MEMBER ESPINAL: [off mic] I'll will ask some.

CHAIRPERSON CONSTANTINIDES: Alright, Rafael. I'm going to pass it over to Council Member Espinal for a few questions.

COUNCIL MEMBER ESPINAL: Thank you, thank you, Chairman. I'm—I'm new to this committee so, I'm going to have a lot to learn and catch up on, but one of my major interests is renewable energy, and especially how homeowners can go about installing some of—some of this technology into their homes. So, what—what would be the—I guess the basic steps someone who lives in a normal brick townhouse would have to go through in order to get a wind—a small wind turbine installed and service to that?

ALLEN PRICE: The first step would be to contact a registered engineer, a registered architect or a professional engineer for the installation. They would consult with the professional for their needs. After that, the professional would evaluate different systems that would be available in the market today, and compare that to the requirements that we have published in our bulletin. Those requirements again they do re-center on safety of the equipment. Of course, anything that's installed in New York you want the environment to be as safe as possible to protect not only the residents, but also neighboring residents as well, neighboring structures as well. So, that comparison is made against our

bulletin. If a new product that is selected that's being considered meets the established criteria, then the registered design professional can accept the product and specify it for use on a project. They will then file with the Department of Buildings. That is the process that I was just outlining previously. Once they submit to us the turnaround time for our first review and evaluations, a three-day period. If everything is in place, it can be approved, and then the application can be permitted at that time.

COUNCIL MEMBER ESPINAL: Is—is there any difference between the residential building and the commercial multi-unit dwelling building owner?

ALLEN PRICE: We do not make the distinction in our bulletin on residential or commercial. We do make a distinction on size. The bulletin covers small wind turbines.

COUNCIL MEMBER ESPINAL: Okay.

ALLEN PRICE: They're typically some residential but for--

COUNCIL MEMBER ESPINAL: [interposing] Right. Have you seen—I mean and I know one of the bills it's in regard to noise, right. Have you

received any complaints from neighbors about the sound that these—some—some of these turbines are creating in the neighborhoods?

ALLEN PRICE: I am aware of any complaints on noise.

COUNCIL MEMBER ESPINAL: Okay, alright. Okay, thank you.

ALLEN PRICE: Sure.

CHAIRPERSON CONSTANTINIDES: Alright, well, Mr. Lee, you've shown support for—for all four bills. I know when to say thank you. [laughter] So, I—I look forward to working with you all and the administration to get these bills passed and working with our Speaker as well. So, thank you.

JOHN LEE: Thank you, Chair. Thank you, Committee.

CHAIRPERSON CONSTANTINIDES: [pause]

LEGAL COUNSEL SWANSTON: Paul Schneider from Michigan.

CHAIRPERSON CONSTANTINIDES: Alright, so—we'll get that again. Alright. That's it. So, we have—the next one we have a—a—someone from Skype again, CGE Energy, Paul Schneider from Michigan. Mr. Schneider, are you there? [buzzing] [[background

comments, pause] [buzz] I guess we'll come back to Mr. Schneider in a few minutes. So, next up. [background comments]

LEGAL COUNSEL SWANSTON: Do you want to—do you want to-- We can do a—we have a couple of people here who are—wind turbines right now, and Ronnie Moore.

CHAIRPERSON CONSTANTINIDES: We have Ian Brownstein.

LEGAL COUNSEL SWANSTON: Daniel Farb.

CHAIRPERSON CONSTANTINIDES: Daniel Farb please come forward, William--

LEGAL COUNSEL SWANSTON: Makena.

CHAIRPERSON CONSTANTINIDES: --Makina, Tashina.

LEGAL COUNSEL SWANSTON: Makina.

CHAIRPERSON CONSTANTINIDES: Yeah, uh-hm, please step forward, and David Branston and then--

LEGAL COUNSEL SWANSTON: He's—oh, he's in Stanford 'til later.

CHAIRPERSON CONSTANTINIDES: Michael Rate.

LEGAL COUNSEL SWANSTON: Michael Rate. I just emailed him. He did not—he is not here as yet.

CHAIRPERSON CONSTANTINIDES: Okay. Alright. [pause] Eric Wyberg as well. Eric, are you here? You can step forward as well and—and testify.

LEGAL COUNSEL SWANSTON: Okay. [pause]

CHAIRPERSON CONSTANTINIDES: Mr. Farb, if you can take your seat just the way we keep things moving. Thank you. Wonderful. I guess we can start with you Mr. Farb and then work our way over. Alright.

DANIEL FARB: [off mic] Thank you, thank you.

SERGEANT-AT-ARMS: Turn on your mic, please. Just push the button right there.

CHAIRPERSON CONSTANTINIDES: The red button.

DANIEL FARB: Like that? Okay. Okay, here we go. Okay, so my name is Daniel Farb, and I'm going to talk to you about how we've made the first wind power solution for dense urban environments. Now, I'm sorry to have to talk a little bit about myself, but I think it's important because there are over 200 small wind turbine types in the world and a lot of them are nutty, and I want to show you that

when I'm talking, I'm talking with a scientific background. Now, some things just about me. I set record at Yale University. I also have degrees in medicine and business. I have 30 patents in the area of renewable energy. For the last number of years I was mostly in Israel before I came back to New York. In that time the wind turbines I'm talking about won the distinction of being considered among the 45 inventions in Israel's history, but the Bloomfield Science Museum. I got the ORGIA label for technological excellence and also were the first wind turbines connected to the grid, and there are a number of other things you can read later, but what I want to tell you is about is how it all started in New York, and we're all from New York here, right? [off mic] So, we almost the centered universe. I'm going to show you that when I was a kid growing on Riverside Drive—

CHAIRPERSON CONSTANTINIDES: I need you to speak into the microphone.

DANIEL FARB: Okay. When I was a kid growing up on Riverside Drive, I would sometimes play with—as—as the wind came whipping from the Hudson River up Riverside Drive, and while I was waiting for

the bus, I would spread out my coat like this and try to catch the wind. And one of the things that struck me as very funny is that there were certain places along the block where the wind gave out, and certain places where it was stronger, and that is the basis of the field called computational fluid dynamics, which is the basis of what I've done in terms of wind. Basically, very simply it's taking the flow of air, of water and figuring out how different obstacles in its path or different structures influence the way it flows. So, that's what's really going to be special about what—what I'm doing, and I've been looking for ways in which to-- Jason, this isn't moving ahead. [background comments, pause] Just a second. It's not moving. There we go. Okay. So there are problems with traditional turbines as we've all hard. They can be very big. There's noise and vibration. The key thing I'm going to focus on today is how the density causes turbulence. When you look at this big wind farms, you'll see that the turbines are separated by five blade diameters from each other, and the reason is, is that their turbulence interferes with each other, and they also have a minimum starting speed of three meters per

second, which is 6.7 miles per hour. Now, what I've done with my company Flower Turbines we've made small ones. They're quiet. They're less noisy than the wind itself. The key thing is the density actually improves turbine performance and by 20 to 50% and this is going to be key for how to make this work New York, and also they start at 1.2 meters per second, which is half of everybody else's. So, let's learn a little bit about different types of wind turbines. On the top left you see a horizontal axis wind turbine. It's based on lift principles. It's too noisy to use in an urban environments. Next down you see lift type of vertical-axis wind turbines also too noisy for an urban environment, and at the bottom you see drag. Now, drag is the least efficient. However, because of the low noise and other factors that can be used in an urban environment. So, what we've done is we've taken the drag concept, we've done some things to it, as you see from our turbine there. As I've going to show you in a second, they have changed the efficiency and the key thing is that by making them in such a way that they can actually help each other perform better, we've made it possible to make large wind farms on a rooftop and to

change the economics. So, this is an example of how it would look. Okay, so there are three sources of turbulence, and excuse me for going through the science, but I think it's important because the science is important here.

CHAIRPERSON CONSTANTINIDES: We—we believe in science here.

DANIEL FARB: What?

CHAIRPERSON CONSTANTINIDES: We believe in science here. It's okay. [laughs]

DANIEL FARB: Yeah, okay, good. Okay. So there are three sources of turbulence. One is the turbine itself can cause turbulence. Number two is turbine to turbine, and number three is building to turbine. So, I have a patent for that addresses each of these issues. Let's go through it. Number one is that we break up areas of turbulence according to a specific formula by placing dividers on the trailing edge. That's Patent Number 1 already granted by the United States and a number of other places. Number 2, and this is what's really crucial is you see on the left how the turbulence reduces efficiency when you put the lift types of turbines next to each other. We have the specific formula whereas our—

whereby our turbines are creating wind tunnels into their neighbors, and you'll see it actually results in a higher velocity wind than the turbine itself receives. You see on the next picture here, you'll see the arrow is pointing to an area of red. Well, the wind is coming in at a yellow speed, which is lower than red, and as it hits the turbine, the turbine is absorbing the energy that comes to it, but it's also deflecting off energy to the side. So that there's actually velocity wind than there was before it hit the first turbine, and when you place the second turbine and a third turbine on each side, each one of those benefits from it. So, that's the most important part of the science. We've done some testing of it, and you'll see that as you move the shaft away from the adjacent turbine there's a spike in the power—that—this one shows almost 50% increase in power just when you take this technology. So, what we've done is basically take—drag e done is basically take—drag vertical-axis turbines and move them into the efficiency level of lift turbines, but without sacrificing the quiet and the low vibration. Now, I'd like to ask everybody in the audience what do you see that's wrong with this picture? What's

wrong with it is you have a turbine here, a turbine there, but the solar is altogether. Solar is cost-effective because you can put them all together. Although how cost effective it is in New York is anther question, but in general it becomes more cost-effective because you can put them all together. But here, you have turbines for show and not for dough. So, the idea is that when you can put then all together, it's a cheaper installation and they feed off of each other. Okay. So, the third problem with turbulence—the turbulence is that—buildings. The long vertical side of a building creates turbulence and vortexes that can interfere with how rooftop turbines work. So, by using different types of aerodynamic tricks, we can get the wind to be higher velocity and less disturbed by the currents coming up from below. So that's Patent No. 3. Okay, so you put it altogether. We did calculations of how you would compare wind with solar. Here I took Cape Cod, which is very similar to New York. In the northeast there's very little sun relatively speaking, and if you're near the coast you have relatively good wind resource. So, you'll see in Cape Cod where the cost of energy is 16 cents per kilowatt hour, which is

even lower than it is in New York City, wind very slightly, our wind, very slightly beats our solar in terms of payback time. However, the big thing is that it's—it's 80% better in terms of money per square foot or of energy per square foot. In other words, it's a much better investment for a northern type of climate when you have the sea breeze available. So, this makes a very big difference in a dense urban environment like New York City, and here I've just compared—you look at it in more detail later some of the more important things about the different criteria that you need in order to make small wind work. It has to be zoneable. It has to look appealing. It has to be cost-effective, and the whole thing of going and getting a permit from the people at the Department of Buildings for just one turbine isn't as cost-effective as getting permit for 20 at the same time, and that's why we're concentrating on the cluster effect and everything that that means in terms of cost-effectiveness. Now, even though I've said some things that could be a little bit negative about solar in New York, I want to explain that I actually believe it's important. It's an important part of the product next and that's

why I put on this next slide. In coastal areas, your peak power is most closely balanced by wind, but even better by wind plus solar put together. Peak power for those of you who don't know, is the problem that you're worst consumption or highest consumption of energy occurs in the middle of August in late afternoon when everyone turns on their air conditioners, and that's usually when you get brownouts and blackouts because of that. That means that your renewable energy's biggest value is going to be to calm down that peak at that time. So, if you look at this, this is a theoretical installation, but it shows you the principle of how wind and to some extent also solar take care of that—of those peaks in the afternoon, and why it can be very helpful. Even if you can't make the whole city have renewable energy, these two put together in the right proportion and the right places can make an impact on something as serious as having a blackout. Okay. So, what are the issues for New York? Well, there's a high cost of energy, there's pollution and wellness, there's vulnerability to breakdown in the power supplies we saw with Hurricane Sandy, and you to regulate—the regulations make it necessary to

produce energy locally. So, I'd like to bring attention now to one of the issues that's not just electricity. It's water heating. Some of you may be aware that there's a huge housing stock in New York that's using carbon sources, and if you're using diesel fuel, the cost of the electricity—the cost of making that into electricity instead of the twenty cents you pay Con Ed, it's more like forty to fifty percent for diesel fuel. And, if you look at this over here, it's hard to see it, but the blue—blue is for buildings, and that is showing the numbers of the noxious gases that are produced in our environment from the water heating from buildings in New York City, and you see it's some—in some cases more than 50%. So, one of the things that we can do is making a cluster of these small turbines. We may not be able to power the building, but we can definitely address the issue of hot water by connecting them to pipes, and instead of feeding the energy into the grid, we feed the energy into the hot water system and decrease the amount that the boilers need to work, and this would be very cost-effective to do. In here I just put on—I went through the numbers on water heating economics. Wind and solar over a 20-

year period come out as you see in the big blue line at the bottom—come out to be more cost-effective per dollar than the oil and even gas because even though it's cheaper to buy the bas burner, the oil burner at front over time when you include the costs of the fuel, and solar and wind do not need the fuel to keep going, the cost it's a much better long-term investment. Okay. Now, I'm going to talk a little bit about what I'd like to do. I would love this to be a market for me, and what I would like to do is do one project of ten in an area of good wind and low buildings. So, we start off where it's a little safer. We're not worried about something flying off the top of the Empire State Building or something like that, right, but a flat roof of a large building. We've got plenty, everything from JFK through Marine Park in Brooklyn, the west side, you know, the Hudson River. As I mentioned, I'd like to have a pilot project here. Now, also I'd like to pilot for smaller ones for homes because the cluster effect could apply just as well for making smaller ones for residential use except that each turbine produces less energy, and when we make then smaller they fit very well with solar systems as well. So,

you can have a combined wind and solar. Many of the buildings that you see in Brooklyn, Queens and the Bronx and then three, a pilot for rooftop hot water demonstration an apartment building. There are tons of them for example in the Bronx and, you know, other places where you have large—large apartment buildings, big flat roofs and where we can do this kind of thing. Now, one of the things I'd like to talk about in general my feeling is that when we start getting too many regulations, sometimes we start making the costs go up, and the difficulty of implemation—implementation. As Costa mentioned, it should be as easy to get renewable energy as for the other things, but it's not, and I wanted to go through some of the different regulations that are needed, and then some specific ones that are in the write-up that I got about the—and—and really talk about what regulations are most needed and what aren't. So, there are a couple of regulations. It has to be easy and cost-effective. There should be some kind of automatic permitting level. So, for example, and I admit that it's in my interest to say this, but it's scientifically true that in general drag turbines are not going to have a noise problem.

So, why make a regulation about noise problem for them. Save it for drag turbines, this type of turbine. You don't have to go through steps a, b and c. So, another thing is you don't want to add renewable energy to the tax assessments. Also, there are different and interesting financing plans. Now, there's a PACE Program. I'm sure a lot of you have heard of PACE Programs, which are mostly implemented. I don't think they're available in New York State yet, but it's something to shoot for.

CHAIRPERSON CONSTANTINIDES: It's something—it was something that we're looking at. Yeah.

DANIEL FARB: Yeah, but it's very—it's a very useful program. It brings down the cost of renewable energy and of not just renewable energy, but energy upgrades in other ways as well. So, other things might be making city buildings more easily available to offer opportunities to get started. Maybe there's some ways in which there can be bank loan guarantees, maybe can work with the Green Bank of New York , which was I think a great idea. I think safety criteria are very important to New York because of the skyscrapers because if something, you

know, goes off it's really, really seriously dangerous, but I think the safety should be clear. They should be reasonable, and they should be adjust to the height of the building. There should be piloting sites available I'm speaking my own interest. It would be nice if we encouraged New York firms like my own that maybe we should get a little bit of an extra benefit because we're going to be doing our corporation or corporate jobs and our financing and everything in New York City. So, I just have some specific comments on proposed regulations. When you're talking about noise, you need to specify the number of decibels at a certain wind speed. That was done later on, but in that particular paragraph it—it doesn't because it's dependent on which speed because the number of decibels go up as the wind speed goes up. I think the definition of 100 kilowatts is very high. Nobody is going to put 100 kilowatts a single turbine on a building, which leads me to a point I'd like to make. There's a difference between putting things on buildings, and putting things on isolated area and—and parks so that maybe some areas in Staten Island where you could put a utility size turbine without it

interfering with somebody. But there's no way that you could do that in Manhattan for sure. So, you may want to make looser regulations for those areas where you can put in more like utility size turbines, and you can take advantage of their higher efficiency in that cases versus the ones that you put in more urban areas, where you have to place noise and vibration at a premium. Another thing about the regulation and breaks some locks. I would say one—I'd say a lock and a break and keep it simple instead of specifying how many. What we count about is the—count on is what works, not necessarily how many we specify. Another regulation you look at the specifics later if you want, and I'm glad to talk about them in more details. Now, why exclude artificial lighting. Maybe it's good for—to be used for artificial lighting. That way it doesn't have to go into the grid. You can increase the off grid. Now, about the visual appearance, you say it can't be brown, but what if you—what if you're going to then put something white on a brown building. There's so many brown buildings on—around New York. So, I would say to leave it open, and it even leaves it open for something I'm interested in doing which is echo art,

which is using the beautiful tulip design and making it different colors that you can have people enjoy the different colors of it. It can be like a work of art, kinetic art actually in the city. I think that another one of the regulations instead of making locks and things like that maybe fencing off would be adequate. With drag turbines there's no issue of shadow flicker so why not leave it only for those types of turbines where shadow flicker is an issue. There—there are a number of things, other things that I can go through in more detail. I don't really want to bother everybody with all the details about this. But I think in general in waterfronts because there was some questions whether or not they should keep it out of waterfronts, is that the drag type, which is not going to be a safety issue, and wanted it here with the public's ability to enjoy the areas. Maybe it shouldn't be excluded from waterfronts and the waterfront is very often the best area because you're right next to the sea. So, let's think about how to handle that in a different way. So, I'm very glad to handle questions. Thank you very much for inviting me. Thank you to William for remembering that from our conversation in the hall at Stony Brook

University this led to it. So, thank you very much everybody. Thank you to Samara for arranging you.

CHAIRPERSON CONSTANTINIDES: Thank you, Mr. Farb, and I'm—I'm—we're going to take everyone's testimony first and then we'll ask questions afterwards. [background comments, pause] Now, we're joined by Kalman Yeger, Council Member from Brooklyn as well. [background comments]

ERIC WEBER: Mr. Constantinides, it's Eric Weber. I have no presentation, but William has said that I'm—it's okay with him if I go up.

CHAIRPERSON CONSTANTINIDES: That's fine, but not everyone needs a presentation. That's okay.

ERIC WEBER: My name is Captain Eric Weber. A brief introduction. I represent McAllister Towing. It is a family owned private business in New York City at the Battery. We have been in business for 150 years, the fifth, going sixth generation. We own and operate about 70 vessels from Puerto to Maine. My background is I'm a master mariner. I've been licensed with the U.S. Coast Guard as a Captain since 1995. I've operated over 100 vessels in many countries mostly tankers and also yachts. I have a degree in law and also in marine affairs, which is

marine policy and environment, and it's not too often you get tanker captains that are versed in the environmental policy as well. We are very interested in the offshore wind sect or because we feel it is a great driver to sort of revitalize New York Harbor. We as a business have seen New York Harbor decline. It's not even on any top 20 list of world ports on any metric. It is a choke point almost. People are bypassing it. Yes, Bayone Bridge has been raised, and yes there have been improvements, but I don't think anyone believes it's going to change the trend of declining arrivals of ships, which is how you measure traffic, and volume of cargo. And what that means is while ships will continue to serve this major market they will not be able to access the—the markets deeper into the continent through New York. They'll choose other ports to do that. So, offshore wind is a great opportunity for folks that have developed this technology and the skill set and have the money, billions. You know, $50 billion is being bandied around to invest in the United States. The United States has granted access to these firms enabling them to move forward. As we all know, the vessel—the vessel traffic separation stream

approaching New York, which is basically a highway a lot of it has been allotted to Statoil, the national oil company of Norway. When the opportunity arises they will invest in, you know, building wind turbines there. Also, South Fork at the eastern end of Long Island. What's interesting is. What's interesting is that the wind does not have to be harvested in the state in which it has landed. So that opens up a whole world of political and practical opportunities including the Continental Shelf, you know, which is federal. So, I won't go into that kind of detail, but it's a very, very promising time. Money has been spent. Investment has been made. Licenses have been given. So, it is no longer abstract. It is coming, and we would like to be at the front of it. Because it's offshore, there is a major maritime component, and in Europe when industry says to the government support us by building a port, the government does that. In America it's less easy. There are more likely to be a series of smaller platforms enabling these investors to build their wind farms, and also to support them because there's normally like a 20-year, you know, maintenance program where you've got to have a constant flow of personnel back and forth.

It's a very hostile environment. We all know nor'easters, hurricanes, storms, blizzards and they've still got to be maintained. So, so you're going to need the personnel with the skillset to go out there. Those have to be U.S. licensed mariners—mariners, and we're going to need U.S. built vessels, which means a higher cost per vessel that almost any other country in the world as a result of the Jones Act. One of our tugs is say over $15 million say in the U.S. to build. In China, a tug of equal quality is $5 million or $6 million. So—so those are challenges that Europeans are going to want to surmount. So, how does that affect us? We-again on the larger picture New York there are very few alternatives to New York Harbor. It's 25 square miles. It's really the best equipped. It's—it's—it's—it's our opportunity to—to make the best use of, and-and there won't be another for a while. On the larger picture, if we fail, we don't have the vessels to do this ourselves. There's no U.S. vessel that exists or can exist in time for this one to arrive. If we do not impress the Europeans that we are capable of building what they required, they will not build it here. They will go to China, and whether

they come back or not is for someone else to answer, and whether we'll develop the skillset or not in time to do it ourselves is—is another-- There's no question the United States has the capability to build landside winter lines. It's just there's a disconnect at the present time between, you know that skillset and the offshore skillset. So, it's really challenging and a very fascinating, you know, position, and what's interesting we find is that not all firms that operate in New York Harbor are New York firms. Because of the nature of the maritime business, you know, we are lodged very permanently here in the city. So, we're—we're looking forward to embracing, you know, any infrastructure improvements, and contributing to it any way we can. We've got 700 or so people, and 70 vessels. So, we're learning as we go, but we'd like to be part of the discussion, and we really, really appreciate the opportunity to be welcome today, and to speak and to listen. Thank you.

CHAIRPERSON CONSTANTINIDES: Thank you Captain Weber. Alright, sir.

WILL BUCHANAN: This is all I have today. Thanks—thanks for having me. I just have a few brief

words. Really this project was—I was more of a facilitator connecting some resources to the committee early on, and I just want to add to the discussion as a practitioner of energy modeling. I have two bullet points that are—that are simple to read. My name is Will Buchanan. The Company is Energy Wall. We're essentially energy modeling and the kind of assistance design with a full suite of renewable capability in terms of modeling solar, geothermal and to a lesser extent, wind technology. We used several different tools in that effort. Auto Desk is a—is a company, which produces extensive software in the energy modeling area. One piece of software is called Revit MEP. The Department of Energy has created an extensive suite of technologies wrapped up in something that's called Energy Plus, and that does [coughs] full building simulation, and win solar geothermal can get modeled within that tool. We also use Map Lab for sort of custom modeling efforts, and the NREL, the National Renewable Energy Lab has created a very sophisticated tool called SAM, which some of you I'm sure are familiar with, which models solar and wind technologies as well as economic—economic aspects in

terms of funding and overall project costs. So, these are some of the things that we do for projects both, you know, high end residential as well as commercial, and some grid scale applications as well. Revit in particular is a—is a 3D modeling based system. So, we-we create d a building model in 3D and that can all the mechanical systems. Here we see some rooftop systems, which might be, you know, typical for HVAC and HVAC related analysis. This is a project we did recently overlooking Central Park for an energy recovery system, which also is probably, you know, would not be particular applicable for—for wind in that location, but some of our clients do have access to—to rooftops and—and other areas would be interested in—in learning more about what in wind can do for their particular application. Just an example of another 3D model of the building with mechanical systems, and this could be used to communicate visually the impact of turbines and also further into fluid mechanical modeling as well. Under the hood, so to speak, in these tools is something called TMY data, Typical Meteorological Year data, which has been assembled over many years. NREL and the Department of Energy

maintain this data, and this basically gives you typical wind conditions for every hour of a given year. So, you can make predictions as to the potential for wind and solar as well as environ— atmospheric conditions for full energy modeling of a building, and how it's exposed to different conditions throughout the year, and as well, the NREL SAM systems application model I believe is the acronym. It is an extensive piece of software, which is highly valuable for economic and energy modeling for solar and wind. This is just an example of what's called the wind rose, which gives wind predictions for a different location in terms of the wind direction, and intensity, and then that same data for every—for the—throughout the calendar year in terms of monthly—monthly data. So, just an example of the type of data that's available, and I'm sure other experts have access to similar. So, that's all I wanted to communicate to the—to the board today.

CHAIRPERSON CONSTANTINIDES: Thank you very much. I want to recognize we're joined both by Council Member Steve Levin from Brooklyn as well Council Member Donovan Richards from Queens. I'm

going to ask a few general questions of the panel, and then my colleagues if they'd like—if they have any questions I'm happy to let them chime in as well. What do you—do you support greater utilization of onshore wind technologies while offshore wind use and distribution matures?

ERIC WEBER: Can I say something to that?

CHAIRPERSON CONSTANTINIDES: Sure.

ERIC WEBER: I'd like to say something that I really like what my neighbor on the left has been saying because I've spent some time in Europe, and I've visited some of the factories that are making wind in Europe and it really is a crying shame that in America we're way behind, and it's a huge industry. It's one of the industries of the future to go off shore--

CHAIRPERSON CONSTANTINIDES: Uh-hm.

ERIC WEBER: --and this is a great opportunity with New York Port and all of the areas along Long Island and off the New Jersey coast as well. Why couldn't it be—why couldn't the supply chain be set up here, which is really the—well, I would hope most—most known port in the area. So, I think that, of course, offshore is going to take a

long time, and it's not going to be enough to satisfy the appetite, and your—even though the actual production of offshore wind can be very cheap, when you include all of the transmission costs, you end up—you're still going to pay 20 cents a kilowatt hour when it actually gets to you. So, that's one of the reasons why you need to develop both onshore and offshore at the same time.

CHAIRPERSON CONSTANTINIDES: And what's the greatest impediment that you see for us to—what are we getting wrong here in New York City that we can do better?

DANIEL FARB: Well, I think that—I'm not sure if it's anything wrong. It's like most of the country, you know what I'm talking about is a new technology, and a lot of people have looked at vertical-axis rooftop wind, and says it doesn't work so well, and they're right. Again, imagine if you took solar panels you could only put one solar panel o this end of the roof, and one on the other end of the roof, who would be using solar panels? So, I'm really the first one that's made that possible for wind where not only can you put them close together, but they make each other perform better. So, it

really changes the way that you look at things. So, the thing that would help me the most in terms of this aspect would be having low cost ability to get zoning, and to get projects and even little lending health or something like that in order to get these projects moving ahead would be the thing that would help me the most, and so—so I'd say, and for offshore, you have to build a supply chain. There's no easy way around it. It may—I mean you may want to specify that New York companies get first choice, but unfortunately we've all fallen behind Europe in that sense, and we really need to make a serious concerted effort of putting together a supply chain. If it's any help, one of my other technologies is in an organization, San Diego or belongs to an organization located in San Diego called the Maritime Alliance, and it's associated with the Commerce Department, and maybe I could put you in touch or other people are interested in developing the maritime industries in the New York area with the Director of that alliance, and partially funded by the U.S. Department of Commerce.

CHAIRPERSON CONSTANTINIDES: Thank you very much.

WILL BUCHANAN: Just one thing I would add is in terms of, you know, predictability in terms of for practitioners to be able to predict energy output is something that I've been investigating, and adding to that toolset, you know, I'd be looking to coordinate with Daniel to see how his models can be—can be targeted at more specific locations. So, that's one thing I can see is going to be required is—is—is better modeling for specific applications that will facilitate, you know, folks like us that are trying to implement these systems.

CHAIRPERSON CONSTANTINIDES: Alright. I definitely appreciate your comments on the bill, Mr. Farb. I look forward to working with all of you. Captain Farb.

ERIC WEBER: Thank you. Just briefly, Arco visits Long Island, and it's kind of an interesting situation because their political board is with Connecticut where Connecticut will try to harvest wind, but they can't plant the turbines in [bell] in—it's contested waters, so to speak. [laughter] So, so, you know, we look offshore to harvest the wind, and the inshore to—for the supply chain and the infrastructure, but Long Island, you

know, is facing challenges. It's—it's got the chokepoint of DW Bridge, you know, to get equipment and cargo out to it. It's got a growing population. It can produce a lot of its own products, and then, you know, export. So—so, we're looking at Long Island and—and getting—getting things rolling and overcoming what—what will doubtlessly be many logistical and other hurdles, but—but we believe it can be done with a great outcome.

CHAIRPERSON CONSTANTINIDES: Alright, great. I appreciate all your testimony today. Thank you for your time.

DANIEL FARB: Thank you. [background comments]

CHAIRPERSON CONSTANTINIDES: Alright, so now we're going to attempt again to Skype in Paul Schneider from CGE Energy in Michigan. [buzzing] [background comments]

PAUL SCHNEIDER: Hello.

CHAIRPERSON CONSTANTINIDES: Hello. Hello, Mr. Schneider.

PAUL SCHNEIDER: Alright, can hear us?

MALE SPEAKER: We can't see you.

CHAIRPERSON CONSTANTINIDES: We can't see you. We can sort of hear you.

PAUL SCHNEIDER: Alright. Let me—let me move the--[background comments]. Hello.

CHAIRPERSON CONSTANTINIDES: Alright, now I can—now I can see you, just not hear you so well.

PAUL SCHNEIDER: Well, alright.

MALE SPEAKERS: [in unison] Hey.

PAUL SCHNEIDER: Let me see the mic volume here.

CHAIRPERSON CONSTANTINIDES: Alright, now we h ear you.

MALE SPEAKER: It's holding.

CHAIRPERSON CONSTANTINIDES: Alright.

PAUL SCHNEIDER: Alright, you're on.

CHAIRPERSON CONSTANTINIDES: Alright, you're ready to go, Mr. Schneider.

PAUL SCHNEIDER: Alright.

CHAIRPERSON CONSTANTINIDES: We're ready for your testimony.

PAUL SCHNEIDER: Well, thank you, Council Members. Thank you for the invitation. We appreciate the opportunity to talk about small wind. I'm actually—he's out of frame now since I moved the

computer closer, but I'm joined here with my Chairman Gary Westerholm.

CHAIRPERSON CONSTANTINIDES: We see him.

PAUL SCHNEIDER: Alirght. Then actually off screen I have Brian Zapitny. He's our President and CEO.

BRYAN ZAPLITNY: Alright.

CHAIRPERSON CONSTANTINIDES: Hi, Bryan. How are you?

BRYAN ZAPLITNY: Good.

PAUL SCHNEIDER: I'm going to sit back down, but there's not room for all of us with this little camera, but thanks for having us.

CHAIRPERSON CONSTANTINIDES: Welcome to New York. [laughs]

PAUL SCHNEIDER: Yeah, thank you.

BRYAN ZAPLITNY: I think we're okay now. [laughs]

PAUL SCHNEIDER: So, as far as what you're guys' objectives are, I'm going back to your— your overall goal for 80% reduction in your greenhouse gases by 2050 and then your interim, the 40% by 2030. We think that small wind has big role to play into that, and we believe small wind is very

economical and feasible with that as far as upfront costs to the possible businesses and residents that may be getting the supply from it, but then we have some other modes that we'll speak towards as well. So, we have a presentation to—that we'll walk you through. Do you want me to just jump right into that?

CHAIRPERSON CONSTANTINIDES: Jump right in.

PAUL SCHNEIDER: Alright, I'm going to share my screen. Alright. So, do you see a kind of blue background and it says windy 20 on it?

CHAIRPERSON CONSTANTINIDES: Yes, I do.

PAUL SCHNEIDER: Very good. So, that is up and working. So, we will—we will start.

CHAIRPERSON CONSTANTINIDES: Alright.

PAUL SCHNEIDER: So, Windy 20 is our provider and wind turbine, and we consider the most innovative wind turbine out there. When we looked at the technology that was existing, there was a lot of either barriers that made adoption hard, or just issues in general that need to be addressed. So, when it came to innovation, we have looked at technological innovations, but this is the turbine

and it works itself, and then financial innovation. So this is those cost barriers that may prohibit it, and then community innovations. How can a turbine technology aside from sustainability aspect, how can it add value and be an integral part of the community? So—so, we will dive into each of these areas in this presentation, but I guess first let's take just a step back as far as the—the history of the turbine, Windy 20, that 20 in its name that stands for it as the 20th iteration of the technology that we're in development of. So, we go back to a few successful prototypes. So, actually Gary Westerholm he—he was very involved in those. So, I will let him talk towards those just for a brief moment.

GARY WESTERHOLM: Alright, thanks. Basically no the left side of your screen is the first prototype that we put together. That was back in 2004 and that was Quebec. That proved the technology, the design and that was part of the—if you go to the next slide—it was part of a work in progress. We were working with Silverstein properties and Skidner, Rhodes (sic) and Merrill to put this type of wind turbine on top of a wind

freedom tower, and that vetting lasted the entire year of 2004, and at the end of 2004, we were told we were their choice. Unfortunately, a month later the building design got changed and we didn't fit. But we were vetted extremely well by all the people that were involved with this project from SOM to any number of other organizations that took us through this, JBB and there was—there was a meeting every other week for eight months getting vetted for this particular project, and we were their choice.

PAUL SCHNEIDER: A tribute to engineering was that this technology BLTE.

GARY WESTERHOLM: Yes, and beat out everybody else, which was—was pretty substantial in itself, and a great accomplishment. Let me step in a little bit. Go back to that first slide. If you look at that—that first prototype and you see all the—the guy wires and—and the struts and so forth, the goal here was to take a vertical-axis machine, which typically is—is built and—and mounted on the ground, and to take that and lift it into the air. Now, if you look at that—that slide to the right, that picture to the right, you see the-the shape of the blade and that machine. That—that tower is 150

foot tall. That blade cage is 86 foot across, and if you look at that blade, it's like the shape of a spaghetti noodle, if you will, and that troposkein shape in the center of that blade is where the energy is produced, and the—the—one of the benefits of a vertical-axis machine is that in an urban environment in the city or an urban environment it's very quiet. The decibel level is about 40. It's compared to falling leaves, and that machine will take wind sheer, wind gusts in a—in a city environment you get a tunneling effect because of the buildings. So, it's very conducive to the—to its environment. Our goal was to be able to lift that cage into the air. It's never been done before, and prove through this process that this could be done in a very close proximity to the building as you can see, and it's safe. We accomplished that. Currently, we have four patents. Excuse me, three patents approved and five additional pending on the technology. We implemented features for life safety, and—and safety situations within an environment where people are going to be near and in proximity to the—the wind turbine. In looking at all of the competitive products in the wind market, just to give you a mind's eye picture,

this wind turbine is 105 foot tall. It is very similar to about the size—a little smaller than a water tower, and it fits within the community very well. It's above the tree line, but it's not a disruptive as far as appearance, and disruptive machine that is going to make noise. You get that whishing sound from the horizontal machines that everybody complains about, and then shadowing and—and flicker and so forth that you hear about in the news all the time, and that creates the not in my back yard complaints that we're all familiar with. The—in the design, our goal was that because of construction times and periods was to solve these problems that everybody else seems to be having. So, we constructed a—a footing, which we call green footing. It's—it's produced within a factory. It's a precast situation that comes in pieces. It shipped out on a flatbed truck, and a standard backhoe can dig this 20x20 hole. When we assemble and put that footing together, then a flatbed truck with a loading rig for the wind turbine comes out to site. Like the kids' TV movie or—or the transformers, the machine actually walks off that flatbed truck. Hydraulically it moves to the site and the footing, and sets itself up. We

have, of course, to—we have to torque bolts to a certain specification, and make electrical connections, but as it stands itself up, it goes into a programming and hydraulic mode where it positions itself, and as you can see in the corresponding slides, it opens up. That blade section is designed that way. Go back to where the blades open up. That blade section is designed that way because of hurricanes, tornadoes, storms in general. The machine is connected to the National Weather stations, and in the event of high velocity winds and possibly debris flying, the machine can shut itself down, protect itself by collapsing the blades to the mast, and after a storm it will re-orient as far as understanding what's happening with the weather and then redeploy. And during that period of time when everybody is down, there's an energy storage component in the base of the—the turbine. So, we're producing power, storing it and we're able to be up and going for a late—life safety reasons. A little ear breaks there. We—we designed a system very similar to a—an airplane wing there where you see the trim flaps in the center of the blade were producing the power. Our goal was instead of using a braking

system to control the—the wind turbine, was to design an air brake style system similar to an airplane wing where we can brake and hold the speed of the turbine at its maximum peak to produce power at any given time, which is 80 RPM. So, during a storm when everybody else needs to shut down and protect themselves, we can operate up until it gets dangerous by utilizing air brakes, which is not friction braking in a sense of like a disc brake or—or how the traditional wind turbines handle their—their control. There is no noise. The affect of the sphere, if you will, of the turbine we received the combination through prototyping through the Audubon Society because the birds actually see it as a tree, and they fly around it, and because of the speed of the blade, they actually were able to navigate and fly through it without being hit, and that was quite an accomplishment. We felt that that would happen, but when we witnessed it, then the Audubon Society witnessed it, they gave us a letter stating that—that we're—we're bird safe, and that was a nice feature. The—that glade structure is made up of 11 sections of blade, and they bend at the joint very similar to your elbow, but then they lock in position while

they're producing power. The machine in the event that it needs any work or maintenance done to it has many features similar to the automotive industry. It was built on an automotive platform where we can lower it to the ground very easily and for maintenance purposes. So nobody has to climb the tower or no crane is needed, and then in addition to that, depending on the environment, the utility we can change the size of the turbine as far as power it produces to meet the needs of the facility or the environment conducive to the utility. So, the machine currently, what we—what we state is a 20, 50 and 65 kilowatt, but with recent improvements to the size of generators, now we can go up to 100 kilowatt and still fit that into our region (sic) and compartment. Everything is in modular aspect as far as the wind turbine. If there is any repair, if a generator goes out or a control system goes out, they're all on a roller-bearing system that approaches very similar, if you were to think of your computer if it loses the hard drive. Just swap the hard drive out. The machine—the wind turbine machine is set up the same way where at the base is where the generator and the control system is versus in the air

like the traditional wind turbines, and we can swap that out in the same day. If we have failure, we send it in for warranty.

PAUL SCHNEIDER: And I just want to note here while we're back on this slide that 65 KW, which is the main plate on kind of a standard model, that produces about 100,000 kilowatt hours annually. So, it is more for a—a larger energy user for the business, a non-profit, a government facility, a school because that's about—a 100,000 kilowatt hours is about 10 times the average residential user. So, while I know when you're long-terms—you talked about community solar and that kind of thing, we could work with the utility to develop a community wind to where this could power residential homes as well. But, it does produce significant power. So, it traditionally is at those larger user sites. So, to go a step further with the—with the wind turbine, is that it was designed for distributed on-site generation. So, if you think about what we're trying to accomplish here, is that we need a small footprint on the property to give them plat of that parcel to produce power for. But in our industry there is no silver bullet. So, we couple the wind turbine with many

different technologies, and that's what we call our sustained model, our sustained program. So, to—to look at a—a broader stroke here of what you're trying to accomplish, and I think this will be helpful to your—your panel is that the—We're looking, bringing up a slide here. That's up. Okay. That the sustained model does not have enough have an upfront cost. We invest into the—the community where if it meets the criteria, the sustained model meets the criteria, and the energy savings that we can capture is—is beneficial for the client as well as the financial investment and then, of course, CGE as well, all three parties need the wind, will invest and—and—and put a sustained model in place. Now, it could be a combination of solar, the wind turbine combined heat and power, efficiencies of many kinds. And just as an example, an existing client, a large insurance company we're handling a project for their headquarters currently and we're able to reduce their carbon footprint emissions 55%, and the—the impact of that to their utility usage as well as the impact to the environment it's substantial. And—and our goal was to have the—the turbine as a center, you know, I guess like a center focal point or brain of the

entire system, and it is. It does many other things other than just being a wind turbine with the—the recent shoot—school shootings that-that everybody is aware of, we've worked life safety features into the turbine in tracking, connecting to Homeland Security, reaching out to the—the local fire and—and police departments, and I can't more about that. There's things that we're doing to patent them, and—and so forth, but the emergency response the—the machine is truly a first responder prior to the—the police and-and these are areas that are very close to all of our hearts. So, we've taken it serious with our partner Rouse Industries to implement these technologies into the machine. So, to recap and just go through the business model financially it's-it's very important to-to show the client the benefit, and we do what we call a mutual success agreement, and we sit down and define if you really—a—a quick description of that would be to really to go to the last chapter of a book and—and find the conclusion, and then work to the beginning to make sure that you meet the objective to get to that conclusion. So, in that mutual success agreement, we're going to look at the existing utility expenses--gas, water and electric—

and how power is being consumed and produced and used on site. Once we identify all those needs, then we write an agreement with the client utilizing the different technologies to meet that goal, and once we meet—met those objectives under the sustained model, then we—we bring the financial investment in and so that it will fund in fuel the project for the given period of time. Now, what's most important in this is that there's no capital cost to the existing client, and in many cases they are either breaking even with no expense or in a positive cash flow from day one, and that insurance company is an example. They're extremely profitable from the first day without a capital investment, and then they're meeting their internal objectives and goals is like what you're looking for, their impact to the environment and then their, you know, social responsibility side of improving what they're doing in the environment and to the community. So, all of those things come into play, and then more importantly the way I see it, more importantly is that it's a focal point within the community if there is a crisis or situation that—that all that information in life safety is there to be handled

through that community aspect of the wind turbine and it connects to all the important features necessary to report to the police and—and like I say Homeland Security and—and the fire department and so on. So, those are things that we're working on very closely to make sure that we can make a difference. Our motto for the company is that we have the power to make a difference, and—and we're using that-that catch line or phrase to—to really show that we're doing what we're speaking, and educating and—and helping in the—in the community.

CHAIRPERSON CONSTANTINIDES: Alright, Mr. Schneider. I really appreciate your testimony today. Thank you for Skyping in from Michigan--

PAUL SCHNEIDER: [interposing] Yes.

CHAIRPERSON CONSTANTINIDES: --you and your entire team there, and we are definitely appreciative of your efforts, and—and look forward to working with you.

GARY WESTERHOLM: Thank you.

PAUL SCHNEIDER: Likewise. Now, I actually, Bryan, did want to speak towards the—there's small wind mapping at all.

BRYAN ZAPLITNY: Yeah, I do. There's—there's a—if I could just add one more thing.

CHAIRPERSON CONSTANTINIDES: Sure.

BRYAN ZAPLITNY: I read this—this bill they're putting forward. So, the traditional horizontal machine in the way wind is—wind is mapped the height that it's done at and so forth, and you—you addressed this here in this piece of literature that Paul had provide me, and the vertical-axis—axis machine is—and how it utilizes the wind tech—technology is different than a horizontal machine. A vertical machine does not have a problem with wind gust or wind directional change. It works very well in an urban environment, in a municipal or—or an intercity environment. We're going to get a tunneling effect, and so forth, but how the utilities and—and how wind has been measured in the past is—is actually wrong for this type of technology. We've done our own testing and our machine at a low class 3 or a high class 2 produces substantial power, and I think it's important that—that with that—that tunneling effect that I'm talking about between the buildings that that's taken advantage, and that's why it was looked at so closely with the Freedom Tower.

Because those wind sheers and gusts and patterns change dramatically, and it doesn't affect this type of technology, but actually in a positive way.

PAUL SCHNEIDER: Exactly.

BRYAN ZAPLITNY: And so, that's what they were—they were studying, you know, they built a beautiful tower there, but unfortunately, they—they steered away from the technology that we had designed and put in place, but through the vetting process we did win that opportunity. So, that's a little credit to our engineering. So, we—we shared our information about that wind breaking because we couldn't patent that feature being that an airplane wing utilizes that technology. With the Department of Energy and they are currently pursuing it with some of the biggest players in the world, the Vesteds and GE's and so on, and we feel that we have quite a solution compared to anybody else in the world of what we bring to the table with our machine, and more importantly the system's approach because there is no silver bullet. I want to keep making that point. There is no silver bullet. It's going to take all the technologies to accomplish the commitment that you've made.

PAUL SCHNEIDER: And thank you. Alright, Council Member is there anything else from—from us as far as the testimony?

CHAIRPERSON CONSTANTINIDES: I think we got that. We definitely appreciate your time. Thank you for Skyping in today?

PAUL SCHNEIDER: Likewise. Take care.

CHAIRPERSON CONSTANTINIDES: Thank you. Alright, so I'm going to call forth the next panel: Bob Wyman, Lisa

LEGAL COUNSEL SWANSTON: Dicaprio.

CHAIRPERSON CONSTANTINIDES: Dicaprio; Roland Lewis. Is anyone here from the Waterfront Alliance still? Ryan Chavez from UPROSE and Paula Sphere. [background comments, pause] Alright. I guess we'll start there on the end, and work our way across.

BOB WYMAN: Bob Wyman.

CHAIRPERSON CONSTANTINIDES: Okay. Is this your testimony, sir?

BOB WYMAN: Yes.

CHAIRPERSON CONSTANTINIDES: Thank you.

BOB WYMAN: Sure. Yeah, first of all I'd like to say thank you very much and commend you guys

for working on wind. I think it's been pointed out that there hasn't been enough done on wind in the city so far. A specific comment on the bills as they're proposed, and then I'd like to talk about a general issue in particular the interaction of wind with beneficial electrification, electric vehicles and heat pumps. The specific comment is that I think it's—it's wise to have siting restrictions for wind in the city, but I would like to encourage you to make one exception of a very specific location in the city, and frankly, that's because as we have the smaller, quitter, safer wind turbines being developed I think it would be really great to think about putting wind turbines in Times Square, if nothing else as a demonstration, and as a very visible sort of symbol of how the city is committed to these goals. I think on that plaza sitting in front of the TKTS booth or some—somewhere down low on a 30 or 40-foot pole, one of these small, quite wind turbines would I think be a great contribution to the city. Or else it will probably end up being the most photographed wind turbine in the—in the world just because of the nature of the people going through there. So, I would like to suggest that that

modification be made to the siting restrictions. Also, I'd like to talk about the importance of—of—of wind particularly as it relates to beneficial electrification, and first of all point out something that I've seen a lot of times. When people are talking about the importance of renewable electricity, they seen to be focused on the question of oh, given how much electricity we have today that's being generated and used for fossil fuels how do we replace with renewal—renewable electricity. I'd like to point out that that's not actually the goal because as organizations like recently there was a report by-from the Brattle Group in January 2017 who essentially said that in the process of moving towards beneficial electrification, as the electrification of transportation and heating, electric vehicles and heat pumps, by 2050, if we're to meet our carbon goals, we're going to need about twice as much electricity as we have today. Not less electricity, not the same amount, which is turned in, you know, made—made from renewable sources, but rather even with all of the protections for what we can do with efficiency in the use of—in the existing uses of electricity, if we are to replace the

tremendous amount of fossil fuels that we use for heating in furnaces and in automobiles and other transportation applications, we're going to need twice as much electricity as we have today. And so, that, of course raises the importance of anything we can do to—to increase the generation of electricity. Now, I'd like to point out that wind is a particularly important electric--source of electricity if you are looking at things like heat pumps, and the reason for it is, is that wind power production happens typically at night and during the winter when frankly the—the need for—the traditional requirement for electricity goes down, but the need for electricity in things like heat pumps goes up. Also, one of the curious things about wind is that as wind—as wind picks up, and it blows harder, you essentially, you're cooling off your buildings, and—and your requirement for heat increases. So, one of the nice things about wind is that as the wind blows harder, it provides electricity explicitly when the heat pumps are in such—need them the most. If you could—I'm sorry. Not everybody has this, but if you could look at the piece of paper that I've given you there, just to show you I'd like to talk about some

of the—the actual impacts of using wind in combination with heat pumps, and what you see here is a chart that shows you for a given kilowatt hour of either additional consumption or addition production of electricity, what is the impact on emissions? On the bottom, on the x-axis you see the—the grid emissions in terms of grams per kilowatt hour, and you'll see that New York City is highlighted there. There are a couple other sample areas in this—in the—in the country showing their grid emissions on that—on that x-axis. On the—on the right axis you'll see the emissions impact of either increase or decrease of production. Now, the interesting thing to look at here is first that horizontal line that sort of bisects this—this rectangle. That essentially shows you for—for solar, for wind for efficiency how much you save in emissions given a particular—for every kilowatt hour given a particular emissions factor for your local grid. The unfortunate thing about these technologies is as the grid is already—it went—as the—at any particular point in terms of efficiency of the grid or cleanliness of the grid as you add more clean production, it turns out that you get less and less benefit as you get—as your grid gets cleaner and

cleaner, and eventually it's trivially obvious if the grid was 100% clean, and you added some additional production, you wouldn't be reducing the—the emissions from your grid at all. You'd be having more electricity, but you, but your—you wouldn't be reducing the emissions. When you have something like heat pumps, you have exactly the opposite effect going on, and those are the lines you see going from—from sort of the—down from the upper left down to the right. And the idea here is that as—as you make the grid cleaner, the benefit from having clean electricity, and using it in something like heat pumps goes up to where its maximum benefit is when, in fact, the electricity you're using is 100%--is 100% clean. We can see on this chart already if you were to say look at a—look at say the line for the COP here of 3.5 on the—on the New York side, you'll see that actually New York City's electricity is already so clean that, in fact, an additional kilowatt hour of electricity consumed in a heat pump gives you a greater carbon savings than an additional kilowatt hour of—of electricity produced with a solar panel or even a wind panel. Okay. The—however, that is not in any way intended to discourage the use of

solar or wind. The wonderful thing here about solar wind is because they are essentially, you can figure that as for marginal electricity they would have zero emissions. Okay. That means we can go all the way over on the—on the left hand side here and we'll see for instance that in New York City when we replace oil furnaces with heat pumps that are powered by solar or wind or other clean technologies, we are essentially reducing by over a thousand grams, okay, our emissions for every kilowatt hour we consume. Okay. That's almost—almost two pounds of emissions for every kilowatt hour by—by using the clean electricity in a heat pump application. Okay, and that's a much greater, much greater use that if you were to simply use that clean electricity for the things that we already use electricity for today. So, one—one final point on that, and I don't know, Samara, if you were successful in getting Professor Modi to—to come today, but Columbia has recently done studies where they look at the economic viability of—of heat pumps within the city, and what they've found is it's because of that match between the production curve of the wind technology and the consumption curve of heat pumps. Typically, wind and heat pumps

both either are consuming or producing at night and during the winter. Okay, what that means is that an economically viable quantity of wind dramatically increases. Traditionally, we've had a problem with wind in many parts of the country in that if you—that often you need to curtail your wind resource because you end up producing too much power at night or during the winter when people don't need it. However, if we increase our consumption of electricity through beneficial electrification at night and during the winter, that means that it's possible for—for the people who deploy wind generation resources, to deploy more of those resources economically, and frankly what that does is it gives you free electricity during the—during the peak periods when otherwise—otherwise the production from wind would be lower. So, I'd like to very much encourage you to continue, and continue encouraging and—and—wind production and—and creating the environment within which it can be deployed in an—in an organized and—and rational fashion, and also to look closely at trying to encourage synergy between the wind strategy and the geothermal and the heat strategy as well. Also, just that one thing and that

is please consider whatever exceptions are necessary to make it possible for us to consider wind in Times Square. It will really be a showcase for the world.

CHAIRPERSON CONSTANTINIDES: I definitely appreciate that.

RYAN CHAVEZ: Good afternoon, Mr. Chairman, members of the Committee. My name is Ryan Chavez and I am the Infrastructure Coordinator at UPROSE We are a social and Environmental Justice organization based in Sunset Park, Brooklyn as well as being members of the leadership of the National Con Ed Justice Movement. I'd like to devote my time this afternoon speaking strictly to Resolution 176. We applaud the Governor's commitment to the development of large scale offshore wind projects by 2030, and this committee's resolution to support this goal. As you know, New York City's most vulnerable communities were disproportionately affected by Super Storm Sandy. These same communities like Sunset Park where we're based had also been overburdened by the fossil fuel economy. Many of these same communities have previously been homes to active blue collar industries and manufacturing, but today communities like Sunset Park face significant displacement

threats as industrial land is being repositioned for upscale commercial development. Offshore wind can deliver power directly to New York City, displacing the need for the dirty power plants that have overburdened communities like Sunset Park for generations. But just as importantly, it can provide an opportunity to position the city at the center of this emerging industry driving local economic development, and when we refer to local economic development, we are really talking about leveraging the industrial waterfront properties in communities like Sunset Park as well as the manufacturing assets found in industrial business zones like Sunset to really advance this emerging industry both in terms of distribution, logistics, assembly and to some extent component manufacturing as well. And now, the city should do two primary things to support this industry and take advantage of its economic potential. I want to make clear that as an Environmental Justice organization, we are no less concerned with the reduction of our greenhouse gases emissions as we are with addressing the economic inequities and crises that are underlying the climate crisis in particular for front line communities like

Sunset Park. So, first, the city can leverage its buying power to catalyze the construction of offshore wind farms after some form of power purchase agreement, et cetera, but second, the city can prioritize offshore wind uses at its pulse and waterfront industrial sites as well, really taking advantage of the economic opportunities that it affords us. This could drive our region away from fossil fuels that threat our climate, and at the same time blunt the force of real estate speculation that are disrupting the culture and the economies of our communities. We again commend this committee for its support for offshore wind, and encourage you to recognize and push for its full potential and impact, and I'll leave it to members of this committee to see my more fleshed out remarks and written testimony, but I thank you very much for the opportunity to comment this afternoon.

CHAIRPERSON CONSTANTINIDES: Thank you, Mr. Chavez. [applause] Yes, we this here. [laughs] [coughs] Thank you. You want to go next?

LISA DICAPRIO: Yes, uh-hm. My name is Lisa DiCaprio. I am a Professor Social Sciences at NYU where I teach courses on sustainability. Thank

you to committee Chair Costa Constantinides for your environmental initiatives and the opportunity to speak at today's hearing in support of two urban wind turbine bills, and a resolution on offshore wind. The urban wind turbine bills introduced by committee Chair Costa Constantinides will facilitate the realization of New York City's urban wind potential. The legal framework for both bills including appropriate siting is provided by the 2012 Green Zone Amendment. Intro 50-2018 defines urban wind turbines as 100 kilowatts or less, and provides several specifications such as sound level, design standards, wind speed and axis that will allow for the protection of public safety in the operation of urban wind turbines. For example the wind turbines "shall be designed to withstand winds of up to and including 130 miles per hour." The Wind Assessment Map mandated by Intro 48-2018 will provide small wind companies and building owners with the information required to evaluate the feasibility of urban wind projects. This urban wind turbine bill will complement Intro 609-2015, the amended version, which mandates identifying buildings appropriate for geothermal systems. The geothermal bill, also

introduced by Committee Chair Constantinides, was passed by the City Council and signed into law by Mayor de Blasio on January 5, 2016. With regard to the offshore wind resolution, introduced by Council Member Donovan Richards, several environmental organizations including the Sierra Club have advocated for offshore wind for several years in various ways, including participation in the New York Offshore Wind Alliance. As outlined in the proposed resolution the Long Island, New York City Offshore Wind Collaborative has determined the feasibility of largescale offshore wind in the Atlantic Ocean south of Long Island. Offshore wind is crucial for realizing the Public Service Commission's 2016 Clean Energy Standard ruling that all New York State utilities must distribute 50% of their electricity from renewable sources by 2030. City Council support for Governor Cuomo's commitment to the development of 24 megawatts of offshore wind by 2030 is especially meaningful at this time for these four main reasons:

1. We must highlight the environmental benefits of offshore wind, and oppose the Trump Administration's reversal of President Obama's

moratorium, on offshore drilling for oil and gas along the Atlantic and Pacific coasts.

2. The New York State Offshore Master Plan has identified several potential locations including in Sunset Park in the Long Island-New York City area for supplied chain manufacturing, which will create new employment opportunities and could establish New York City as a hub for offshore development on the Atlantic Coast.

3. By developing offshore wind farms in the Long Island-New York City area, we can create models for largescale wind projects along the Atlantic coast, which will provide locally sourced wind power to several urban areas, and

4. Scaling up offshore wind will reduce its cost and facilitate technological innovations.

First, we're already benefitting from the achievements of deep water wind, which developed the first wind farm in the U.S. specifically the wind farm on Block Island between Rhode Island and Massachusetts.

Secondly, we will benefit from the experience of European offshore wind developers. In January 2017, Statoil One, the Bureau of Ocean Energy

Management BID for the New York Wind Energy Area that comprises 79,350 acres and has the potential for generating one gigawatt of electricity Statoil will construct wind farms with turbines that have a name plate capacity of 10 megawatts, the largest produced currently in the industry, and with integrated battery storage which will allow for he transmission of electricity into the grid without the intermittency typically associated with solar and wind power. With these initiatives, the City Council is demonstrating its leadership in promoting renewable energy, and keeping fossil fuels in the ground. Thank you.

CHAIRPERSON CONSTANTINIDES: Thank you. Next speaker. [background comments]

PAULA SPEAR: I'm Paula Spear. I'm from Bay Ridge Brooklyn, and I'm a member of 350 Brooklyn, and I'm seeing how much work people have been doing here. We have all these exciting developments, this innovation, these turbines are quieter, they're less expensive, they're more efficient, and we have our city's Environmental Protection Committee doing all this work to look at what we need to do to make the 80 x 50 standard. And arriving at these ideas of

setting up maps to identify the installation spots and making clear specifications for them, and I'm also noticing here we have such a wide array of expertise nationally, internationally. It was also mentioned in Section 426 for the Building Code on the design standards. So, we're seeing the use of the science that's being done in other places, and if these two initiatives are successful, we'll also have a model that can be exported to other cities to help them develop turbines, and I think that this is a good example of the kind of collaboration we need in order to combat climate change. So, thank you to the—this committee and its advisors for showing us that we don't actually live in a kakistocracy at least not in New York City. [laughter] My co-op building—I live in one of those big ugly brick buildings. It's got about 80 families with that flat roof. It's about two blocks away from the waterfront. I don't know if that means its disqualified from the actual turbines, but it's like the structure, the—the board structure of the buildings on the waterfront, and I can see that having the maps would help us put—those of us residents who want our buildings to get the turbines

will be helped by these maps because we can go to our board members and our building sponsors and say we're—we're a good candidate for this. Let's do it, and then we'll have Initiative 50 with its specifications that ill help us do things like a void plaguing our neighbors with shadow flicker, and making sure that we don't have hazards for falling in hurricanes, and on that note, I'm—I was thinking a few days ago as I was contemplating coming here about all of these huge satellite dishes, and things that actually look like the oscillator that the first speaker about, the Spanish Oscillator. They're sitting at the corner on a 7-story building. They're on the parapet at the very corner of the building. There is no setback, and they—they look like they're yearning to take wing, and they just want today [laughter] to be there. So, I'm thinking if—if you get a lot of arguments about peopled worried about the safety of these enormous things on our rooftops in our hurricane prone city as it is now is, you might point out to them, well, if we're all universally interested in having these satellites for our TVs, and we're willing to take the risk for that purpose, we ought to be willing to take the risk for

free electricity and comment on climate change. And I think the biggest concern I was thinking before I came here was going to be noise, though the best source I could find was this Huffington Post blog by Brian Keane, which is actually pretty good reading. It's spelled K-E-A-N as in Nancy E-Brian. He posted it in 2011 in Huffington Post about people complaining about the—the noise from—from the big turbines that they have in the area, and he was pointing out that—that while the smaller ones are louder, they're about 60 decibels as opposed to 40 decibels, they're masked by the wind sound. It would be about the—like a dishwasher I think somebody else may have mentioned. And another thing that was occurring to me to on my way over here was that if we're worried about noise, I would be more worried about the people who honk their horns for non-emergency reasons, just because they want to express their general discontent. I'd be more worried about that. That's the comparison to make if people make these complaints, but after listening to these contributors here today, it sounds like we don't have a problem with noise if we work with these people who have come up with these marvelous innovations. It's

really exciting and the beautiful tree thing. I can't have that on my building, but we can have the oscillator and the drag thing. They would—they would probably fit. So, it's really exciting and, of course, the big thing I think we're all—we all have in mind is jobs. We're going to have jobs probably from the mapping. I don't know how that works, but somebody is getting money for doing that, and we have jogs for manufacturing for these things that people will now buy because of your initiatives that you're setting up and jobs, of course, installing them. And one thing I just want to note, and maybe everybody is thinking of this, but there have been issues with importing renewable technology into our country with the International Trade Agreements, which tend to bar from coming in here because they're said to be interfering with our domestic industry, and that's something just to watch out for. Hopefully, we can skirt that issue and, of course, it's fine to encourage local industry when we can, but we would like to be able to use the—this international cooperation. And one other thing is that as I was listening to this last—the tree device and how it's going to take care of every aspect of our lives, but

one thing that had me a little bit nervous and that they want to have their emergency shut-off systems all run by the Internet, and anything that we're doing like out of the—with the emergency locking or braking, I hope that we have some kind of manual—alternate manual control for those for—for safety. So, thank you so much for all your work, and I'm very much in support of your initiatives.

CHAIRPERSON CONSTANTINIDES: I want to thank all of you for your testimony today. I know that we've had lots of different testimony from lots of different folks from all over the world, but I appreciate you coming here, and testifying and being part of the conversation in person. Thank you.

LEGAL COUNSEL SWANSTON: So, now we're going to have Ian Brownstein from Stanford University.

CHAIRPERSON CONSTANTINIDES: Alright, so, he's—he's Skyping in?

LEGAL COUNSEL SWANSTON: Yep--

CHAIRPERSON CONSTANTINIDES: [interposing] Alright.

LEGAL COUNSEL SWANSTON: --from California.

CHAIRPERSON CONSTANTINIDES: Alright.

LEGAL COUNSEL SWANSTON: And Skype is just--[buzzing/pause]

CHAIRPERSON CONSTANTINIDES: Mr. Brownstein.

IAN BRONSON: Yep.

CHAIRPERSON CONSTANTINIDES: Brownstein. [background comments]

IAN BROWNSTEIN: [background comments] Thank you for having me here today.

LEGAL COUNSEL SWANSTON: Can we—can we hear?

CHAIRPERSON CONSTANTINIDES: A little louder.

IAN BROWNSTEIN: Can you hear me? [background comments] Can you hear me? [pause] [background comments, pause]

CHAIRPERSON CONSTANTINIDES: Mr. Brownstein, if you could put your volume up, we might be able to hear you.

IAN BROWNSTEIN: Can you hear me now? Is that better?

CHAIRPERSON CONSTANTINIDES: Yes.

IAN BROWNSTEIN: Okay. Yes, so if my screen being shared with you?

LEGAL COUNSEL SWANSTON: Not yet.

CHAIRPERSON CONSTANTINIDES: Not yet.

IAN BROWNSTEIN: Okay. Let me know when you're ready. [pause]

CHAIRPERSON CONSTANTINIDES: Still not getting it.

LEGAL COUNSEL SWANSTON: We're not seeing your Power Point. [background comments, pause]

IAN BROWNSTEIN: Is that better?

LEGAL COUNSEL SWANSTON: Yeah, I see your telephone. Okay.

CHAIRPERSON CONSTANTINIDES: Here you go. Here we are.

IAN BROWNSTEIN: Okay, great. Yeah, so, I'll just go ahead and read my statement. So, good afternoon and thank you for the opportunity to testify before you today. My name is Ian Brownstein and I'm a Ph.D. candidate in mechanical engineering at Stanford University. My PhD research has focused on wind power with an emphasis on optimizing energy output of groupings of vertical-axis win turbines. Additionally, I'm a co-founder of the Export Energy

Company, a start-up seeking to develop high performance vertical-axis wind turbines technologies. Many people are familiar with the traditional 3-bladed turbines, which dominate wind energy today. These turbines are known as horizontal-axis turbines since they move on an axis parallel to the ground. In cast, vertical-axis turbines vertical-axis turbines rotate on an axis perpendicular to the ground. The images of both turbines are shown here. You've seen a number of technologies over today including some vertical-axis turbines that look different than this one. They come in many flavors, but the common feature is that they rotate on that vertical-axis. Vertical-axis wind turbines have a number of advantages for urban wind energy capture compared to the more commonly seen horizontal-axis wind turbines. Due to these differences in loader geometry vertical-axis wind turbines are omni-directional, meaning they do not to be turned into the wind. This means they can operate more effectively in the presence of turbulent wind conditions typical of urban environments like New York City. Additionally, vertical-axis wind turbines are mechanically simpler than—simpler than horizontal

accessing turbines reducing the potential maintenance costs of a turbine over its life span. One example of this simplicity is that the generator and electric components of the turbine can be installed at the base of the turbine tower providing easier access for regular maintenance and inspections. Providing ease of inspection is essential for turbines installed on rooftops where a crane may otherwise be needed to perform this maintenance. Critically, vertical-axis wind turbines can attract significantly more wind per unit area of land that horizontal-axis turbines. This means for a given rooftop available for wind turbine installation a grouping of vertical-axis turbines cold collect at least eight times more power than the similar group of horizontal-axis wind turbines. In the space for wind turbines—since space for wind turbine installation in New York City is mooted (sic) this additional energy capture would go a long way in increasing the effectiveness of the small wind turbines installed under the proposed legislation. Regardless of the technology used, wind energy is only effective in locations where the wind resource is significant throughout the year. In a complex urban environment like New York City, this

can only be assessed with detailed wind maps like those that have been collected that Intro 48 is about. To demonstrate the importance of well characterized New York City wind resource on the cost of future energy—wind energy projects, the top flow as shown on your screen here was adopted from the Department of Energy in 2016, Distributed Wind Energy Market Report. In the plots color schemes small wind turbines that are found to be 100 kilowatts in size or its wind turbines that are found to be greater than one megawatt in size, and midsize turbines are shown by the other colors between these values. Since Introduction 50 proposes that wind turbines in New York City be less than 100 kilowatts in size. The small turbine data are of significant interest to this conversation. This chart shows that the levelized cost of energy on its verical axis, which is the cost of energy over a turbine's life cycle including financing, installing, operation and maintenance, and this value you obviously want to the cost of energy to be lower. So, lower values are favorable. The capacity factor is on the horizontal-axis is par. Where the capacity has expressed the percentage of the annual actual energy production of

a turbine divided by its annual potential of energy production if it were to operate continuously at its full nominal capacity. The plot demonstrates the simple but important fact that projects with less annual winds will cost exponentially more than projects with well characterized and significant capacity factor. Using the wind maps, which Introduction 48 will provide, a wind project's capacity factor can be accurately estimated during the project's planning phase. This will allow the economic viability, the potential power output of the wind project to be judged before any investment is made in storm wind turbines. In conclusion, I am in support of both Introduction—excuse me—48 and 50 because they are both essential for deploying small wind turbine throughout New York City. Introduction 48 when shared by any potential small wind projects in New York City operate a low cost of energy. Introduction 50 paves the necessary guidelines for small wind turbines to be installed in the city safely. In combination, I believe these two pieces of legislation will allow New York City to develop to develop the best version of any potential wind energy

projects. Thank you and I'm happy to take any questions that you may.

CHAIRPERSON CONSTANTINIDES: So, just speaking to the two pieces of legislation the things that you think we should improve in relation to some of the specs in Intro 50, things that we can do better, tighten up the language and so on?

IAN BROWNSTEIN: Yeah, no, I think the specifications are good. I'm not as familiar with the noise ratings of these turbines, vertical-axis turbines in general are less noisy than horizontal-axis turbines, and I think the 5 decibel rating is a very achievable metric. I think in relation to Introduction No. 48, it would be useful to specify the type of wind resources assessments that I'll be taking. For example, it's not fair to me if anemometers, which are devices, which measure wind speed will be up and running throughout the year or if they'll just be arrested every fifth year for short periods of times. Wind resource maps are most useful if they're taken over longer periods of time. So, if could have a select number of instruments that run throughout the five-year period that these can be

useful in addition to additional measurements on every five units.

CHAIRPERSON CONSTANTINIDES: And what other legislation would you think that we would need here in New York City to help promote the use of wind power in the city?

IAN BROWNSTEIN: Well, I think it would be additional legislation separate from what is listed here. I think it's—I think it's just part of--

CHAIRPERSON CONSTANTINIDES: [interposing] Yeah, just take it take through like what else can New York City do to make it easier for implementation from your point of view?

IAN BROWNSTEIN: I think that the most important thing would be having the first wind project to figure out what those problems will be. I'm not familiar with the rest of New York City's Building Codes. Typically those codes will limit the ability of turbines being installed. So, when you start to plan a project late in the project planning phase, issues arise. So, I'm not familiar with New York City specifically so I don't know if issues will come up. One example is with the turbine foundations

having legislation, which specifies the requirements for what the base of the turbine has to look like with these bills specifically on rooftop since I think your top wind is a really promising approach for wind energy in New York City especially with better vertical-axis turbines we can really choose the amount of energy that's collected putting in the roof top area.

CHAIRPERSON CONSTANTINIDES: I definitely Mr. Brownstein appreciate your testimony today, and thank you for Skyping in from Stanford, and we much appreciate it.

IAN BROWNSTEIN: Thank you. I appreciate your time.

CHAIRPERSON CONSTANTINIDES: Clara Chandler is she still here or did she have to leave? She had to leave. Okay. Kartik Abernathy. Kartik if you could step forward. I apologize if I spelled— I pronounced your name wrong. Ling Su. Alright. Kathleen Skopic. I think she had to leave, right.

FEMALE SPEAKER: [off mic] But I'm from here office and I'll read her testimony. (sic)

CHAIRPERSON CONSTANTINIDES: Okay, and Daniel Carpen. [pause] Thank you. Thank you to all

your tech support today. I appreciate all the really great work. Thank you. Alright, sir, would you like to go first, on the left?

KARTIK ABERNATHY: [off mic] Good afternoon. [on mic] Good afternoon. My name is Kartik Abernathy and I'm here to testify on behalf of the New York City Environmental Justice Alliance in support of facilitating the city's use of wind power. Founded in 1991, the New York City Environmental Justice Alliance, and NEJA for short is a non-profit citywide membership network linking grassroots organizations from low-income neighborhoods and communities of color in their struggle for environmental justice. Through our efforts member organizations coalesce around common issues that threaten the ability of low-income communities of color to thrive and coordinate campaigns designed affect city and state policies including energy policies that impact these communities. Because the number of NEJA member organizations come from communities over-burdened by greenhouse gas emissions and co-pollutants from power plants and dirty industries clustered in their neighborhoods, our organization is a key advocate for emission reduction

and renewable energy targets. Our New York City Climate Justice Agenda is a multi-year research and advocacy campaign to address the need for a comprehensive community based approach to community resiliency. In 2017, we released a report, which analyzed Mayor de Blasio's OneNYC Plan and made several recommendations to strengthen the city's policies in Environmental Justice communities including committing to an offshore wind power purchase agreement. We highlighted and, but in addition to its promising economic potential wind power particularly through large scale offshore wind development can have extensive environmental and health benefits in vulnerable communities who have been historically exposed to noxious pollutants generated from fossil fuel energy infrastructure. Resilient energy systems including wind power coupled with energy storage have the potential to displace inefficient and dirty peaker plants thus significantly reducing air pollution in Environmental Justice Communities. The city should study, prioritize and streamline the deployment of wind power systems in the coming years. The city should also study progress made to date, and strategies to

reduce barriers for wind development including technical policy and regulatory barriers. We recommend that any wind power cost benefit analyses include economic, social, environmental and resiliency benefits inclusive of robust equity metrics. We are confident that a cost benefit analysis that is truly inclusive of all co-benefits would justify the procurement of wind power despite potentially high initial costs due to long-term net benefits such as the establishment of local renewable energy industries that bring sustainable jobs to the city. We also support Intro 598 because requiring all city-owned buildings to be powered by green energy sources by 2050 can be an important step in catalyzing local offshore wind and renewable— renewable energy industries. In pursuit of a just transition, New York City should be leading the nation in the procurement of large scale renewable and resilient energy technologies that meet ambitious emission—emission reduction targets with strong Environmental Justice principles and labor standards. NEJA commends the New York City Council and Chairperson Constantinides for holding a hearing on facilitating the use of wind power, and creating and

opportunity for public comment on this important strategy to increase community resiliency. A just energy policy is central to NEJA's work and we look forward to a continued collaboration with the city to mitigate the threats of climate change while optimizing economic health and environmental benefits for the most burdened and climate vulnerable New Yorkers. Thank you.

CHAIRPERSON CONSTANTINIDES: Thank you. [bell]

LIN JO: Chairman Constantinides, thank you for holding a hearing this afternoon. My name is Lin Jo. I'm a Co-founder of United for Action, a grassroots group in New York City working to end our addiction to fossil fuel and nuclear power, and advocating for renewable energy. I'm here to express our support for Intro 48 and Intro 50. 2017, was a third hottest year on record, ranked behind 2016 and 2015 according to scientists at the National Oceanic and Atmospheric Administration. This is part of the long-term warming trend. Renewable energy such as wind and solar is our best chance to reverse global warming, and reduce harmful greenhouse gas emissions. Intro 48 introduces the creation of wind maps, which

will help demonstrate wind energy generation potential in New York City much as the creation of solar maps, which helps to demonstrate the solar energy generation potential in New York City. This bill is a step in the right direction. A group of us from United for Action visited the since Municipal Recycling plant in Sunset Park, Brooklyn about two years ago. We saw the wind turbine turning gracefully generating electricity for the recycling plant. Even when we were standing right beneath the wind turbine, we could not hear much of any noise from the wind turbine. The only other urban wind turbine I am aware of in New York City is the wind turbine at the Whole Foods Supermarket at Gowanus in Brooklyn. The passage of Intro 48 and Intro 50 would hopefully spur the construction and development of more wind turbines, more urban wind turbines in New York City. Offshore wind is potentially the bet option for delivering large scale renewable electricity generation to New York City and Long Island. Offshore wind power will not only reduce greenhouse gas emissions and fossil fuel use for New York City, it will also generate jobs and stimulate local economy. With climate change and sea level

rising, time is of the essence. New York City needs to begin developing offshore wind power now. We commend Governor Cuomo for committing to the development of large scale offshore wind farms in New York. We support and urge New York City Council to pass Resolution 176 advocating for the development of large scale off shore wind projects. Thank you. Next, I'm going to read for my friend Katherine Skopic who had to leave.

CHAIRPERSON CONSTANTINIDES: Uh-hm.

LIN JO: Okay. I Katherine Skopic am here today as a New Yorker, U.S. citizen, parent, an artist, activist having worked with the Sierra Club, Interfaith Moral Action on Climate and the People's Climate Movement. By a divine creator, science or both it took 4.6 billion years of constant construction to form our planet flourishing with its rich variety of life thanks to conditions such as optimal chemical makeup of our planetary core, water and position in our solar system. Yet, we could destroy it all in two decades if we continue to burn fossil fuels. The existential threat is great for life, our children and all future generations who cannot speak for themselves and for whom I humbly

speak now. Time is short to make these urgently needed mega changes in our energy systems. That's why I work with and applaud all of those individuals, organizations and leaders who are dedicated to moving us forward to renewable energy such as solar, wind, geothermal and tidal. Incidentally, in regard to tidal, I recently learned that there is a project underway at the Bay of Alfundi (sp?) to harness the power of their extreme changing tides. Here and in particular I thank Costa Constantindes, Margaret Chin of the New York City Council for having introduced these two bills enabling wind turbines to be part of our energy mix here in New York City, and for their support of the resolution to support Governor Cuomo in the development of offshore wind for New York State, helping us achieve the goal of 50% of New York State's electricity coming from renewable sources by 2030. I applaud educators who are preparing students and all citizens to accept and support wind turbines as a welcome part of our energy supply helping to improve our health, protest—protect the environment, and urban—and enabling us to achieve our local and state life saving energy goals. You may have noticed

the wind turbines I painted on my dress. She did. She wore a dress with--

CHAIRPERSON CONSTANTINIDES: [interposing] Uh-hm.

LIN JO: --wind turbines. This is the horizontal access type most of us visualize when we think of wind turbines. However, there are many designs for wind turbines. These can be installed on vertical walls of buildings originally designed into a building or made as free-standing structures combined with solar and placed in parking lots to serve as electric vehicle charges. In 2012, I attended the 20th anniversary of the First United Nations Global Climate Conference in Rio de Janeiro, Brazil. The U.N. Global Climate Conference in Lima, Peru in 2014 and at Hop 21, Global Climate Conference in Paris, France 2015. There, 195 countries agreed to support the Global Climate Accord with its monetary commitment to the clean—to the Green Fund and it's climate commitment to keep our global warming to 1.5 degrees Celsius or less. Nationwide it is our local and state leadership on climate actions that are effectively keeping us in the Paris Accord. Despite their withdrawal and lack of

leadership. This is a global reason for supporting our New York City Council members in this significant legislation and I applaud you all.

CHAIRPERSON CONSTANTINIDES: Thank you and so thank you. Please give Katherine my best.

LIN JO: I will thank you.

CHAIRPERSON CONSTANTINIDES: Mr. Carpen.

DANIEL CARPEN: My name is Daniel Carpen. I reside at 3 Harbor Hill Drive, Huntington, New York. I am a professional engineer. My comments are very brief on Introduction No. 96. On page 21, line 21 there's a word: Last Energy Efficiency Report. What this bill essentially does is kick down the road and delay getting energy efficiency reports prepared for cooperatives that have buildings on—on numerous tax lots, more than one tax lot. I am against this law. It does not—it does nothing to save energy in the city of New York. It only delays energy conservation work. What we really need to do is completely rewrite Local Law 87. I've given you comments. I've given them to Samara Swanston, your—your attorney, and when will this be done to make it far more effective?

CHAIRPERSON CONSTANTINIDES: Please continue.

DANIEL CARPEN: That's my question.

CHAIRPERSON CONSTANTINIDES: That—this—it doesn't—it's not—doesn't go that way. So, do you want to continue your testimony? If not, we can continue--

DANIEL CARPEN: [interposing] Well, also—all I'm saying is that this law doesn't do much.

CHAIRPERSON CONSTANTINIDES: Okay. I appreciate your—your testimony today.

DANIEL CARPEN: Thank you.

CHAIRPERSON CONSTANTINIDES: Thank you. I thank you all for testimony, for all your testimonies today. I appreciate your time and your effort to be here and thank you.

LIN JO: Thank you.

CHAIRPERSON CONSTANTINIDES: Alright, seeing no other testimony to be heard, I want to thank everyone who testified today from Stanford, from Spain, from Michigan, from here in our city 250 Broadway, the 14th Floor Hearing Room. Thank you, everyone who participated today. We look forward to working with the administration on these four bills.

Again, I want to thank Samara Swanston our staff attorney, Nadia Johnson our Policy Analyst, Jonathan Seltzer our Financial Analyst, and with that, I will close this hearing.

LEGAL COUNSEL SWANSTON: Ken Williams.

CHAIRPERSON CONSTANTINIDES: Oh, Ken Williams our intern. Ken, thank you as well, and with that, I will close this hearing of the Committee on Environmental Protection. [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 6, 2018