

A special meeting of the Board of Aldermen was held Tuesday, August 6, 2019, at 7:00 p.m. in the Aldermanic Chamber.

President Lori Wilshire presided; City Clerk Patricia D. Piecuch recorded.

Prayer was offered by City Clerk Patricia D. Piecuch; Alderman-at-Large David C. Tencza led in the Pledge to the Flag.

The roll call was taken with 11 members of the Board of Aldermen present; Alderwoman Melizzi-Golja, Alderman Harriott-Gathright, Alderman Klee and Alderman Schmidt were recorded absent.

President Wilshire recognized those members of the Environment and Energy Committee in attendance as well as Assistant Fire Chief Walker, Fire Commissioner Paul Garant and Charlie Hall, Conway Ice Arena Board of Director.

His Honor, Mayor James W. Donchess was also in attendance.

#### President Wilshire

Thank you Alderman Klee is on vacation; Alderman Melizzi-Golja is on vacation and Alderman Schmidt is not feeling well and won't be joining us this evening. Also in attendance from the Environment & Energy Committee, Doria Brown, Anita Arden Cala, Deb Chisolm, Kerrie Converse, Bob Hayden, Justin Kates, Carrie Lambert, Sarah Marchant, James Pyle and Sylvie Stewart. Tonight we have a presentation and I will turn it over to the Mayor.

#### COMMUNICATIONS

From: Lori Wilshire, President, Board of Aldermen  
Re: Special Board of Aldermen Meeting

***There being no objection, President Wilshire accepted the communication and placed it on file.***

#### PRESENTATION

Solar Energy Presentation

#### Mayor Donchess

Thank you Madam President. What I will do is give you an overview of how we have gotten to where we are then Ms. Chisolm and/or Ms. Marchant will tell you a little bit about the procurement process, the RFP we put out for the energy provider that was selected, that being Revision Energy. Then Revision will give you a presentation regarding what we hope to do with solar on city buildings as well as the Conway Ice Arena. In addition to some members of our Energy Committee, of course we have representatives of the Fire Department, Assistant Chief Walker and Commissioner Grant and Charlie Hall, thank you Charlie for coming, is President of the Board of the Conway Arena. So it is good that we have everyone here.

So some months ago we determined that we would like to undertake to solarize some of our City Buildings. We put out an RFP asking for energy providers, solar providers to provide a structure as to how they would undertake to provide solar for these buildings. We asked them to examine various buildings to determine which are more amenable in the short term to make solar conversation, erect a solar array. And there is some time pressure here because there is a tax credit associated with the construction of a solar array which declines or is reduced at the end of 2019 that Revision will explain more about this. But the tax credit still exists in 2020 but it is lower than it is if the construction is completed in 2019.

So we put out the RFP, we had four or five responses and as I said, either I think Ms. Chisolm and maybe Ms. Marchant will fill you in on some of those details but we had a Committee to review the responses and the best deal for the City was provided by Revision Energy. They were selected, there were a number of people on the Committee and then they and the City moved forward to examine the buildings where solar might work. It came down to 3 or 4 possibilities where this would work well right away. One was the garage, the bus garage the transportation garage out on Riverside Drive. You need both a roof that is amenable to this and also a structure that can support the weight of the solar array. In addition, the Lake Street Fire Station was one of the other buildings that was identified as a good candidate for solar. There was some work done on the transportation office building where Public Works is as well. That was questionable from a structural point of view. Also the Public Works Building was examined, the Public Works Garage, that could work for solar but we really need at least 10 and maybe 20 years of life to make the solar investment worthwhile. Since the future of the Public Works Garage is in doubt, we could be replacing it or expanding it or something else; that was thought to be not a good fit for a long term project such as this.

Also, because the financial benefits to be gained by any participant in the solar project grow to the extent there is a larger scale, it seemed like it made sense to talk with the Conway Arena about including us together in basically the same project under the same terms. Of course their finances would be separate from ours but we would both gain the benefit as a result of a larger scale project. So we talked with the Board of Directors of Conway and they were very receptive to the idea because they do use a lot of electricity. Now they have one concern and I think we can take care of that and that is that the City's lease with Conway is running out in not too long, Charlie can give us the exact number of years. They would like to extend the lease under the current terms for another 20 years. That would be a separate proposal coming to the Board of Aldermen so that they can participate in this project and make solar work for them over a longer term period.

It seemed to me, of course the Board of Aldermen would need to approve the extension of the lease, but it seems to me that they have done an extremely good job for the community offering low cost ice to our high schools teams as well as providing ice for all of our recreational hockey and many other, adults free-skating. They have done an extremely good job of managing this situation and they have in addition generated profit in the neighborhood of \$650,000.00 which Alderwoman Caron can tell you they have contributed as a member of the commission, that they have contributed to the non-profits in the area. This year there were about \$50,000.00 or \$55,000.00 worth of awards. So the relationship, public/private partnership with Conway has been, I would say high successful and therefore to me the extension of the lease is something we would do anyway and if it helps them help us with the solar project that seems like something that we should in my mind undertake and certainly seriously consider.

In any event, that gives you an overview of the situation I think. Now I would ask either Deb or Sarah or both to come up and kind of brief us on the procurement, what was done to select, vet and select the various energy companies which led to the selection of Revision Energy.

#### Deb Chisolm, Community Development

Hi, Good Evening, I am Deb Chisolm I work in Community Development with Director Marchant. The Mayor did an excellent job of pretty much covering everything. We did go through a procurement process, of course we followed all the rules and regulations of the Purchasing Department downstairs. But we were lucky to get proposals from 4 different solar companies. It gave us a lot of options and a lot of a learning curve for myself, I am typically, my hat is usually Waterways Manager but for tonight I am Solar Person. Sarah and myself and Bob Hayden from Standard Power were the review committee. So we reviewed all of the proposals that came in. We got 4 proposals in; we took 2 and moved them further, asked specific questions about specific properties and specific pricing. Thankfully, again Bob Hayden was on our review committee because Bob is standard

power. He has got an excellent background in solar and renewable energy so he was really able to dive into the pricing that was being offered by all the competitors. As is turned out Revision Energy was for us the preferred vendor. So far, I mean the selection was made several weeks ago, a couple of months ago and I know Revision is really chomping at the bit to get started on this. We have been working very closely with them. It has been a bit of a challenge to find the right properties.

As the Mayor indicated there are many different criteria that will keep properties in the portfolio or kick them out and one of the things is the status of the roof. Not every building that the municipality owns has a new roof so that has been a very huge challenge to figure that out. Thankfully we were able to have Conway come to the rescue. They have an expansive roof that is in really great shape. So again Dan and James will give you way more of the details on how this is going to play out with the power purchase agreement that we need to get into with Revision Energy similar to what Conway Arena will be also signing up for as well. So if anyone has any questions specifically for me, the details are going to come from Revision Energy and their presentation. But from a purchasing standpoint, if anyone has any questions I am happy to answer.

Mayor Donchess

Thank you, now I would just add before we bring up Revision that of course we have a couple of major goals here that have been articulated by the Board of Aldermen, by the Energy Committee and by the City. First, we are trying to reduce our carbon footprint and we have established some goals with respect to that. This will help us work towards that goal. Revision will tell you if we sign this and we can get this done by the end of the year we may be able to add a couple of add-on buildings that are not good enough to be standalone but could possibly be added to the project. City Hall being one of them and possibly one or two others.

And of course the other goal is to save the City money which we can do and you will see the details of the financials when they present the details regarding the cash flow and the rest of it. So thank you to Deb and everybody who worked so hard on coming up with this. One more thing, we really need to give Conway a clear sense that this lease extension would be acceptable so that they can undertake this with confidence and I think we need to take some steps we hope by the end of the month, end of August. But we can talk more about the timing and the details later on.

President Wilshire

I think that Alderman Laws had some questions for Deb before we call Revision.

Alderman Laws

No I can wait until the end.

Mayor Donchess

No go ahead, I mean why not?

Alderman Laws

I remember vaguely someone once said there is 1 million square feet of roofage in our public school system and I am just wondering why that hasn't been a consideration. I feel like those are, some of them are relatively recent structures that could support it.

President Wilshire

Alderman Dowd did you want to take a shot at that?

Alderman Dowd

Yeah I'll take a good shot at that. Most of the schools, even though they have flat roofs, do not have the structure to hold the weight of solar panels. We are looking, we will have if we build a new school down in the south part of Nashua we will have solar panels on the roof. But as far as the other schools, they weren't built to hold that additional weight. So the only other building that comes to mind that could support the weight is the Police Department. That building was built so that they could one or two additional floors, so I would have to presume that it is strong enough to hold solar panels assuming we are not going to add a couple of floors to that building. But no we've looked into the other schools, if there is a roof that will support it, we will look into it. But most of them won't.

Alderman Laws

Thank you.

Mayor Donchess

Now I would add to that that when we hire the new energy manager which you have authorized, there are school projects that certainly can be undertaken. For example the one that we have talked about with the School Department and which could yield, there would be some costs associated with it but which would yield significant benefits is the conversion of each of the high schools to LED. Now we have seen some rough estimates that might involve and an investment of \$1 million dollar plus per school but could save \$125,000.00 plus per year after that investment is made.

But as we sort of began to talk about that project or that idea the energy manager would be able to work in detail to design the project that would work for the school, that would maximize the energy savings while at the same time accommodating the needs of each group at the schools. Enough light for the teachers, the students and it needs to be a very detailed examination of each building to determine exactly which lights should be converted and what is the best project and to define the project and then put it out to bid or work with a private provider to undertake a project which we define. So I think that's when we get the energy manager on board what we will try to work on with the School Department.

Alderman O'Brien

Thank you Madam Chair, President. I would like to ask Ms. Chisolm a question, perfect for you because you are in charge of the dam project and everything. How does this effect the State as far as the net metering, kind

of concerned before we go down this road, which is I think is definitely worthwhile. But I know there's in total, we have the dams that are generating and we are getting some net metering with that. And put these other projects and pile that on, is there any jeopardy or anything are we going to top off that we are generating too much?

Ms. Chisolm

No that won't be the case. I would put a pitch in for people supporting the over-ride of the veto of HB 365 which would expand net metering to 5 megawatts for those who might be listening, State Reps.

Alderman O'Brien

I think you are preaching to the choir here.

Ms. Chisolm

I will say that is something that has been supported by all of the State Reps in Nashua, it is preaching to the choir but it is choir then preaching to their friends who might not have an understanding of what net metering really entails. But no, adding the solar project on is not going to put us in peril of topping off and like I said, Dan and James have the details on exactly how much power will be generated and how that net metering will actually work for the solar projects themselves.

Alderman O'Brien

Thank you.

President Wilshire

Ok anyone else? Ok.

Dan Weeks, ReVision Director of Market Development Good evening and thank you very much for the opportunity to present the solar proposal for the City of Nashua. My name is Dan Weeks, a resident of Nashua joined by James Hasselbeck, Director of Operations for Revision Energy. I serve as Director of Market Development. We clearly appreciate the due diligence that Deb and Sarah, Bob and others on behalf of the City have invested over a few months now. It has been a joy to work with them and we are excited to be here today to present what we think is a very beneficial and positive initial phase of solar projects for the City with plenty of potential in the future should the City decide.

I wanted to start with a quick introduction of Revision Energy. We are, James and I represent 260 co-owners of the company. We are a 100% employee owned company. I have been installing solar in Northern New England since 2003 with our co-founder Bill Behrens beginning actually in the 1980's. There has been obviously a lot of development in that time. We take a lot of pride in being an employee owned company; meaning the guys up on the roof and gals who also install with us, do have an equal stake in the company and are deeply invested in doing it right. We are also a Certified B Corporation, a benefit corporation, which is a legal commitment we make as a company to operating in a Triple Bottom Line manner. That is profits are part of what we do as a private business, but people and planet come first.

We have so far constructed over 8,000 solar energy systems and complimentary technologies as well to enable buildings, municipalities, private homes to be non-reliant on fossil fuels and energy, self-sufficient instead. Our Mission is to help this region, New Hampshire is where we do about half of our business. We began up in Maine, we do also work in Massachusetts as of the last 2 years. Our Mission is to help our communities make the transition to self-reliance, to clean renewable energy and to protect the things we value; clean air, clean water, clean land in the process. We will focus naturally on solar at this point but any chance we get to educate folks around the stead of complementary technologies that do in fact make it possible for individuals but also communities to lessen their reliance on imported energy through some of these complimentary technologies.

A couple of the non-profits and municipalities we have been honored to work with and with and I would point out just across town from here, the Nashua Soup Kitchen and Shelter was one of our first local projects two years ago. I am very proud to be helping them save money through this purchase agreement which I will describe in a little more detail in a moment. On the commercial side we also work with a number of good businesses in New Hampshire and in the region. We can go into detail if you'd like on other municipal projects that we've done but just a couple of examples here in New Hampshire which are similar in scale or type of technology to what we are proposing for Nashua. Again we are happy to provide details and references if you'd like.

Finally we were proud two weeks ago to be named again for the third consecutive year the Number One Solar Installer in New England and we have received some other honors. We are part of a growing community with close to 1,000 solar jobs in the State. Many good contractors that we consider partners and we do expect in the coming years to see many more added as well.

I am going to give a quick overview of how we settled on the two recommended sites for 2019. Ask James who runs our construction end of the business, actually building the systems to provide a little bit more detail and answer technical questions you may have about the types of installations and then I'll return to the all-important financials for this proposal.

As you heard from the Mayor and from Deb there are a lot of City rooftops that are potential candidates for solar down the road. I am not zooming in all of them here by any means but three main areas that we focused on with a starting list at the outset of the PPA several months ago of 24 city properties clustered in downtown Nashua, out at the Waste Water Treatment Plan and at the DPW and Transit Garages. We did do careful assessments of 10 of the initial 24 after doing some initial assessments of all 24. The two highlighted are the ones that we are recommending at this point. But just for your interest to give a sense, at the top the first five are what we defined as the maximum value opportunities.

These are projects with fairly substantial scale, economy of scale as the Mayor mentioned do certainly matter in terms of the economics of these projects. But through an extensive vetting process over several months, we did narrow down to these two projects which again is not to say that we wouldn't love to see Nashua with us or other solar companies install on many other roofs. But in many cases roof age was a concern as much as we can put panels on a 15 and 20 year old roof and sometimes if the owner is preparing through some resealing of seams that does make sense, but generally we don't recommend it on roofs of that age. We would rather wait until they are replaced, so that was the primary reason why these projects, the ones not highlighted were excluded from the portfolio, but we can provide more detail if you wish on others.

Needless to say there is a lot of opportunity and should the City determine after a first wave that it makes sense to add, we certainly would love to see the City do so with us or with other contractors. Let me turn over to James to provide a little more detail on the two highlighted projects. We can also speak to Conway if you wish although we felt it appropriate to focus on the two city-owned buildings for tonight.

James Hasselbeck Thanks for that overview Dan and thank you everybody for the time this evening. So as Dan mentioned, my role is to oversee our design, estimating, construction and operations and maintenance arms of the company. I am a construction guy so I am happy to get into the weeds particularly of any concerns the Aldermen may have on any of these projects and hopefully address them. So the first building we wanted to focus on is a really great opportunity here at the Transit Garage. So what we see here is obviously an overhead image, each of those little blue rectangles represents one individual solar panel. Each solar panel is roughly 3 ½ feet wide by about 5 ½ feet tall. So we are right around 19 ½ square feet. On this type of roof, a flat, EPDM or rubber sealed roof, we do not penetrate that roof surface and that is really important. My team is a bunch of engineers, plumbers and electricians. We are very, very interested in building solar energy systems and not at all interested in owning roofing warranties.

So we work, but obviously as you can imagine a key part of our business, so we work extremely closely with all the major roofing manufacturers prior to our installation. If you in the procurement or construction world, you may be familiar with something called a submittal process. So we do something fairly similar; so prior to any installations we get ahold of the existing warranty holder on the roof, whether it is the roofing manufacture or the roofing contractor. We basically submit to them the details of the racking manufacturer that we are going to use. All of the big roofing manufacturers have a very specific process in place where they basically review and then confirm that the products that we are using will not void the warranty. That is a crucial piece of us; sometimes there are inspections involved and there are certainly a lot of back and forth that we undertake. But the key takeaway for this group I think is that the work we are doing here will not be putting holes in these roofs and we will not be impacting any existing roofing warranties. There is a documentation stack about this thick that we provide at the end of the project.

So how this works, we are not putting holes in the roof, so what we are doing is we are doing a lot of smart engineering and we use what is called a ballasting system. So basically, we are using, wait I don't know what photos you have there, yeah so you can see in some other similar projects we have Contemporary Automotive over in Milford, Tupelo Music Hall, and the Wirebelt just up in Londonderry. But basically we have determined that by strategically placing a very specific quantity of concrete ballast blocks in a very specific weight structure that that provides enough downward pressure to hold the solar panels secure. It adds anywhere between 4 to 7 pounds per square foot of dead load to that building; the differences is based on the wind load and the building factors. Part of our due diligence as Dan alluded to, we also do a structural engineering review of each building. So we go in with our professional engineer, take a look at the building structure and confirm with 100% certainty that everything that we are doing is structurally sound. I guess that's kind of it.

Mr. Weeks And I would just point out that the production data you see the array, the capacity, that's the DC Direct Current Capacity of 103.9 kilowatts, 297 panels and then really the important number there is the power output 106,500 kilowatt hours per year. A quick word on how we come up with those projections?

Mr. Hasselbeck Sure so you can see the graph in the top right corner and it is difficult to see the things on the bottom but on the left hand access, vertical access, that's the production quality on a monthly basis and our east to west access is months starting in January and ending in December. So as you can see, we see very low production in December, January and February because we are basically assuming that those arrays are going to be covered in snow and it not worthwhile for anybody to get out there and shovel these rooftops. So basically we just model out that production and how we get to that modelling is using some industry standards software; it's not our own guessing. It's a program called Helioscope which is vetted by both the National Renewable Energy Laboratory and a lot of financial institutions that invest in these projects. We are able to provide really accurate production data by utilizing existing weather data from this area. I think our ticket is in the Nashua Airport for this specific site; so very detailed, historical weather data over 30 years in town. Then we look ok here's our system, here's the pitch of the panels, the orientation of the building to provide a really accurate idea of what we can expect for power generation.

The other thing that we consider as far as our design goes is long term longevity and usability of that building so you will see on the Transit Garage, it is kind of a funny shaped array. Well we want to make sure that this system is going to be operational for 30 plus years. In that time frame all of those little boxes there, those are HVAC units, air conditioners, compressors, they are going to need to be replaced, they are going to need to be maintained, they are going to need to be accessed. So we want to make sure in our designs to account for that so future City maintenance, totally outside of the project, outside of the solar project is not negatively impacted. So that is the reasoning for the kind of broken up array there.

Mr. Weeks And just for your interest before moving to the next building, we do have on this overview slide the percent offset of these facilities, you see load offset the right most column and for that Public Works Garage that projected output, power output amounts to about 70% of the power consumption. I can speak in more detail to Alderman O'Brien's question about net metering. But in brief, that is a fairly ideal arrangement where all of the power will be used behind the meter sort to speak on an annual basis, with a little bit of surplus power generated during the peak summer months, less than what is consumed obviously during the lowest production winter months. But you will be getting the equivalent of full value for nearly 100% of the power because as a "small customer generator" a system below 100 kilowatts AC, that's the AC inverter rating, I can differentiate a little more detail if you'd like. But as a defined small customer generator, the net metering statute provides for the ability to use that power anytime within a monthly billing cycle; meaning a peak summer day like today where you overproduce, will provide power that you use next week when it is raining within the same billing cycle or at night when the HVAC and the lights may be on. So we can elaborate in more detail if you would like but being at close to but below 100% is really an ideal place to be in terms of the value of solar electricity and both of these facilities are 70 and 81% a nice place to be. James, the Fire Station?

Mr. Hasselbeck Sure so this was the second project that we identified that would provide the greatest economic and environmental value to the City on the Lake Street Fire Station. So it is a beautiful building and here we are looking at a more conventional pitched roof. So here again it is a metal standing seam roof, so if you are familiar they are metal plates with these kinds of little seams that are visible. Those are our favorite kind of roofs to work on in New Hampshire for two reasons. One, they last forever so there's no issues about roof longevity and two, we are also not penetrating these metal roofs. We work with a couple different manufacturers who design and supply these types of clamps and they clamp directly onto the seams themselves. So instead of penetrating through the roof membrane and into the structural surface of the building, we are clamping on to those seams to give us the structural integrity we need to support the solar array.

Here, because we are not relying on concrete blocks, the dead load is significantly less. So these systems we are only adding anywhere between 2 to 3 pounds per square foot. Even so, we still run through the same type of professional engineering analysis to confirm the structural suitability of the building. So this is a very straight forward install again, the big concerns that we always get is "what is going on with my roof warranty". We are going to be able to maintain that, we are going to be able to utilize a variety of different roof surfaces; you see we are not putting solar panels on the northern side of things focusing on the most productive sections of the roof and it is fairly straight forward from our perspective, these are very simple installations.

Mr. Weeks And I would note again that 126.8 KW that is the DC the panel rating. That is each of the 409 panels times their wattage of 310 watts. That is again, the DC rating, the AC rating, we have capped strategically at 100 kilowatts to retain that small customer generator classification which increases the value of every kilowatt hour that we export.

Mr. Hasselbeck I think that that's a really excellent point. Solar frankly is quite complicated. We are trying to balance economics, we are trying to balance environmental goals and we are trying to balance often rapidly changing State and Federal Policy.

So it's basically our job to figure out what the best end result is, taking all those factors into consideration which is why we landed on these first kind of few buildings here to kind of strategically maximize both the financial and environmental benefits to the City.

And just a few examples of pitch roof installations what we are more familiar with seeing in our community is the flush mounted arrays on these pitched roofs. In the lower right you see a similar standing seam metal roof. It will rise about 3 inches above the seam so plenty of room for airflow and a very straight forward installation. Dartmouth College in the upper right also uses primarily standing seam roofs, we have done about 20. So solar systems have 3 primary components; the solar panels which generate the electricity and DC power, the racking which is our method of attachment to the building or the ground area and then the inverters. So the inverters are kind of the work horses of this system. So the inverters take that DC power generated by the solar system and convert that into usable AC electricity that then gets fed into that building's electrical system.

So high-level overview of how it works is when those solar panels are generating electricity, the inverters input that power at the same voltage that building typically would use. So in these cases we are talking about three phase, 480 volt power. The building will use that solar energy first and any excess power that the building needs that the panels are not generating will be pulled in from the utility just like it is normally. But as Dan mentioned, there is also going to be times when the solar panels are generating more power than that building is using at any given moment and in that case the excess goes out into the grid taking advantage of that net metering regulation that the Public Utilities Commission has made law and providing credits to that utility account.

The other really neat thing about the inverter technology and the systems that we have designed here is it gives us also a very high level of visibility into each individual solar panel. So we are using something called Solar Powered Module Level Electronics, but basically it provides two key benefits; safety primarily for first responders in the event of an emergency and then data monitoring access. So what that means is that I am able to see each individual solar panel in what we call a data monitoring portal. And I am able to make sure that that individual panel is performing up to our expectations and meeting the warranty obligations as well as our production estimates. That also provides a ton of opportunity to take that data, which there is a huge amount, and utilize it in other initiatives in the town. We have had great success with other municipalities by integrating some of that data that we are able to pull from the solar energy systems into local educational curriculum as well as helping provide really hard output data to achieve any carbon off-set goals that the City has. So we are going to be able to provide that.

The other benefit I mentioned is safety. Safety is a major thing that we think about all the time, right? So the other advantage of these power level electronics is in the event of an emergency, we have one switch, you can see some disconnects out there. These big gray boxes are all disconnects, one switch gets turned off in every single solar panel within 30 seconds goes to 0 volt or less than 15 volts so effectively 0. So if there ever was an incident on that roof where first responders needed to get up there to put out a fire or do anything else, we want to make sure that they are protected and not working around live PC electricity and these designs take that into account.

Just a rundown of the major components, we spoke about these, if you'd like to know more just a little more detail on the two primary components, the solar panels and the inverters I do want to add a word on the technology we use. It's hard for me to add one word but long story short, we at ReVision Energy we take our engineering and system designs extremely seriously. So we are New England based company, we live and work in these communities. Every solar panel, every inverter is not manufactured equally. We focus exclusively on what we call and what the industry calls Tier 1 Components. So Tier 1 means that we and our partners have gone through some pretty strict quality vetting processes, not just on the manufacturing but also on the finance ability and bankability of that particular company.

As on a previous slide that Dan showed, there is really some long term warranties for many of these products; 25, 30 years and a really long commercial life. Well that's only helpful if that company is around to service that warranty. So we are very serious in the products that we recommended because ultimately we, ReVision Energy, are standing behind it. The other advantage we have is we run our own, we call it the Operations & Maintenance Division so I have a team of 9 Master Electricians who go around and maintain our 8,000 systems that we have been building for over 14 years. That also gives us some great insight into what does go wrong with these systems over 10, 15, 20 years so we can then integrate that knowledge into both our component choices and new system design engineering to try and solve the problems that we are identifying in older systems. Sorry I couldn't do that in word.

Mr. Weeks Cheers. We've thrown a lot of info on you in terms of design and engineering. This final slide is a quick window into the process that our team goes through. Do you want to wrap it up?

Mr. Hasselbeck Yeah so frankly the construction is the easiest part of this project. For the Fire Station I think once we actually started construction we would be in and out of there in roughly 3 weeks; between 3 and 4 weeks on the other building there. So the bulk of the work that we are doing is right now; the finalizing our engineering and design, working with the utility on what is called the Interconnection Application. That makes sure we don't run into any of those net metering issues. So we do all that stuff. Our structural engineering to confirm that the buildings are sufficient capacity wise; coordinating with the roofing manufacturers making sure that warranty gets maintained; procurement you know it is, have you heard about these tariffs? That has made my life very, very difficult. It is very difficult, but that's a different meeting. The procurement is another piece that we have to start very early. So basically the bulk of our work is in those three big orange lines that you see and then we kind of have anticipated roughly 3 to 5 weeks of actual physical construction once we start. So we are quite anxious to get moving on these projects in the near term. We have already kind of in a gesture of good faith we have started the Interconnection Application process. We have started the structural review process and I have, you know, our vendors you know anxiously awaiting purchase orders for this equipment so we can kind of meet these construction time lines which actually provide a financial benefit if we get it done and operational in 2019 which I think you can get into.

Mr. Weeks I think that gives you quite a bit of information but we are happy to take questions regarding the design and engineering and then we can get into the finances. Yes sir, we can perhaps work our way around.

President Wilshire

I am going to call on people; I am going to start over here with Alderman Clemons. Thank you.

Alderman Clemons

Just a question construction wise can you do this up to when the snow flies or what is your limitation?

Mr. Hasselbeck So yes is the short answer and yes for a variety of reasons. One it is actually really important for us as a business to provide 12 months employment to all of our co-owners. So we work right through the winter. What gets challenging once the snow flies is the ballasted flat roofs. So if we were getting close to the snow season I would make sure that we built that building first and then we would move to the Lake Street Fire Station second.

Alderman Clemons

Ok thank you.

Aldermen Jette

So is the purpose to provide the electrical for the electrical needs of the building on which the solar panels sit more than generating electricity that could be used elsewhere. I mean I'm wondering why we are putting them on buildings to begin with, I mean why not put them on like a solar farm, on land. You'd avoid all the problems with roofs and whether the building can support it and all that stuff.

Mr. Weeks Good questions; we do all of the above. The value of doing rooftop solar is that when you use that power onsite, beyond the meters sort to speak, you are off-setting full retail priced electricity, power you would otherwise have to buy from the utility at that moment in time. In practical terms that can mean a premium on a per kilowatt hour basis of anywhere from 10 to 30%. So it is higher value when used onsite. That said, naturally when you have multiple acres to work with you get terrific economies of scale and the build costs do come down commensurate with that. We are pleased to be in discussion, it is still fairly early stage that Deb has facilitated with the Nashua Airport Authority which has several unused acres to the far west of the runway and that is certainly a possibility for 2019 where the City could generate multiple megawatts of power to offset the equivalent of dozens of buildings.

Alderman Jette

Thank you.

Alderwoman Kelly

Yes so you mentioned a couple of times the small customer and I was just wondering is that per each project or is it combined, if we add more do we end up above that at some point.

Mr. Weeks It is strictly on a per-meter basis. So if a building had multiple meters you could have multiple small customer generators at that site. So it would not be impacted by adding any future projects in the City.

Alderman Laws

First of all thank you guys this is awesome, what you are doing is can't be overstated how important the work you are doing is and I appreciate it. That being said, I am kind of dumb and I have a couple of questions. So you kind of answered the question I had about snow and it is surprising that there is not technology that exists that melts the snow off of the solar panel. Does that exist, is it just cost prohibitive?

Mr. Hasselbeck Sure great question and we go back and forth all the time. Long story short, it is not worthwhile. So there are products and technologies out there which utilizes you know low voltage current to get up there and melt the snow to keep the snow off the arrays. But as we all know as New Hampshire residents, in the winter months, you know, December, January, February, that sun may be out two or three hours a day right. So basically the energy and cost of that energy required to melt that snow is significantly less than the additional electricity that you would get from having clear solar panels through that time of the year.

Alderman Laws

Thank you and speaking of technology, it tells us that 18 months from now there is going to be cheaper or smaller solar panels right?

Mr. Hasselbeck It tells us that about computers.

Alderman Laws

Ok but it has nothing to do with this technology?

Mr. Hasselbeck It actually doesn't.

Alderman Laws

Is it upgradable if there is new technology that comes out?

Mr. Hasselbeck Sure, awesome question. So I've been in the PV Industry for 12 years which actually makes me like really old for the PV Industry so that's kind of cool. But in that timeframe we certainly have, don't get me wrong, we have seen significant improvement in that technology. But not a huge quantity, nothing like More's Law on efficiency of the panel. That efficiency has gone up, certainly from roughly you know 12 to 13%, 10 plus years ago; to now we are seeing 18 to 19%. But the biggest driver of this explosion in solar energy that we have experienced in New Hampshire and Nationally is not increases in efficiency, it is reductions in manufacturing cost. So as that demand has gone up, what we have seen is the manufacturers have ramped up to meet that demand, significantly reducing the cost.

So while the technology has improved, that has not been the biggest driver there, it is additional manufacturing capacity and lower costs there. So the solar panels themselves, as Dan mentioned, you know they have a 25 year warranty and a 40 year lifespan. There is very little reasoning from what we've seen to update those panels. You know these things are going to pay for themselves in a few years and then you are just getting free electricity. And what we would see and this is now me speculating a little bit, but I do expect to see some improvements in the inverter technology.

So if we think about the system, the solar panels are kind of dumb; it is glass, aluminum and silicon just sitting there. You know electrons are hopping up and down making power. The brains of the operations is within that inverter. So I certainly expect, during the lifetime of these systems, to see improvements in that inverter technology which basically allows them to interact more intelligently with the utility grid; things like demand response. In those cases the inverters are actually quite easy to swap out. So you don't have to touch any of that work on the roof and in 10 or 15 or 20 years if we wanted to improve our inverter technology, that would be a very easy change.

Mr. Weeks And I will just note, you will see the financials in a moment, we do model a full replacement of the inverters on each of these systems mid-way through the system life. We just assume that is an expense you will have at some point during the system life, so we have included that in the financial model.

Alderman Dowd

I have a few questions and actually the first one is from something you originally said. If you put them on a roof and the roof has to be replaced, how difficult is it to have the panels moved and reinstalled and is that something that comes with the warranty or is that additional cost if the roof has to be replaced, you need the additional cost allocated to move and reinstall the panels?

Mr. Hasselbeck It is not difficult to do that, but it is time consuming. In the State of New Hampshire 100% of a solar array needs to be installed or in this case removed by a licensed electrician or someone involved in the electrical apprenticeship program. So it is labor, it is significant labor that would be an expense. So that is one of the key reasons why when we started out with this portfolio of 30 plus municipally owned buildings, we narrowed it down to what we determined was the highest value. Frankly we want to avoid that scenario where you do have to remove and then reinstall them.

Alderman Dowd

So you want a roof that is got at least a warranty of the same warranty you have with the solar panels?

Mr. Hasselbeck Not necessarily because that's not foreseeable. So I guess and you know we can get into how the economics work in a little bit more detail. But these systems do reach a breakeven point well before the end of their useful life span. And any power production or electricity savings has that breakeven point, that's all gravy essentially. So you know if there is a roof replacement need at year 30 of the solar system, you know, that solar system had paid for itself multiple times over and you've seen those benefits there. What we want to avoid is the need to replace that roof and the need to remove and reinstall those solar panels within that 15 year time frame, that's kind of the break even.

Alderman Dowd

I'm hugely in favor of solar panels but just some questions because we may be building a new school and putting one on top and cost is an extremely important characteristic. So from a maintenance standpoint you would have to plan buying a roof say on top of a school, that would normally cost hypothetically say \$50,000.00 to replace. It might be double if you've got solar on it and you have to move it and reinstall it.

Mr. Hasselbeck Potentially but there's also things that we or any other solar developer and that roofing contractor and that roofing manufacturer could do on the front end to basically avoid that need. We just recently completed a project for the Dover Technical High School; brand new building, brand new roof. We were able to get involved with the Joint Building Committee early and the architect early and they made some decisions on the design phase which had a minor increased cost to the roof, but avoided or will significantly reduce future expenses. Things like backing board and you know millimeter thickness.

Alderman Dowd

So the other question I have is on a year to year basis, how much preventative and correction maintenance has to be done on the solar system? Who does it and who pays for it?

Mr. Hasselbeck Excellent question. So during the term of the power purchase agreement, the owner of the array pays for that. So in this case that would be an investor group that we've done and they would pay me and my team to come out and do what we call an annual inspection. It is about a 20 page report of things that we look at both mechanically and electrically to basically do preventative maintenance to maximize the up time and longevity of this system. We are also on a daily basis, for systems like this, monitoring the production and we have really excellent visibility into what is going on a per panel basis. So if there is an issue we are able to identify it remotely and then make a determination if we need to roll a truck to fix it or if we can resolve it remotely. So that is all handled by the owner of the PPA.

Alderman Dowd

Good answer to go along with a good question.

Mr. Weeks I will just note Alderman Dowd, also in the financials that we will get into in a moment we include an optional O&M Contract were the City to elect upon entering into ownership of the array to continue having ReVision provide that service. That is a totally optional expense but to be conservative in the numbers we are assuming you are paying for that and so not having to think about the Operations & Maintenance in the future.

Alderman Dowd

Ok the other question I have is that there is a lot of technology going on, we've just alluded to a little bit. MIT is doing a lot in the solar panel arrays. They are making them from different products now than they used to. You need fewer panels now. I have no idea in having read these articles when that is going to happen. If we build a new school we are 2 years away from a solar panel, minimum. So we don't know how the technology may change between then and now. But I know they are looking at like two face solar which uses the reflective light that goes beyond the panel, gets it coming back. I don't know if you've been involved in that at all?

Mr. Hasselbeck Yep very much so. So those are called, please stop me if I get into the weeds, this is my zone right here. So those are called bifacial modules. And in some scenarios they make a ton of sense because they allow us to harvest extra bits of solar energy and get more production. In these specific types of installations, in the State of New Hampshire with our climate the additional energy that those panels produce do not justify the additional cost of those panels. But that is specific to these buildings. Where we really like those bifacial modules is on solar carport designs where now we have instead of maybe 6 to 12 inches between the back of a panel and a roof surface, we have you know 10 to 12 feet in a nice reflective parking lot surface so we can really harvest that extra energy. Or a large ground mounted array can be another good opportunity for those bifacial modules.

Alderman Dowd

Right so and I noticed in the articles it said they like to do them on flat surfaces not angled roofs because of the way it reflects. Also the other technology that is coming in is are panels that sort of follow the sun to some degree to increase their efficiency.

Mr. Hasselbeck Another great question, so those are called trackers, they are solar tracking arrays and they make them that track the access in one way like this and also dual access trackers so they will follow it north and south and east to west. Those options are out there. In some cases they do make sense, not in these

cases because what that does is we are adding significant extra cost to our racking and support systems, which really must be offset by the additional generation that they provide. So in these power purchase agreement projects where we do typically have expansive roof or ground spaces, the juice isn't worth the squeeze.

Alderman Dowd

Ok the other thing that is being discussed in places is having part of the power from the solar panels be able to charge batteries that can be used especially in the winter when you get some power and they can put it in the batteries and use it at night for instance. Is that something that you're involved in?

Mr. Hasselbeck Deeply involved yesterday I was just in Durham with EverSource and UNH talking about their micro grid initiative. So we are deeply involved in that; we are the largest installer of commercial and residential battery based systems in New Hampshire and Maine. Right now, today – for these types of projects, that technology is not cost effective, it actually harms the economics. But what is really great is we are designing all of our systems to be future compatible with what we call AC Coupled Battery Systems. So your new school in particular, another 2 years give or take, we are going to see the same downward pressure on battery cost, manufacturing costs that we've seen historically in PV panels. So I could make a convincing argument that instead of a conventional propane generator for your new school, we should spend that money instead on a large battery which will provide emergency backup power and also provide additional opportunities for savings by doing demand response, which the utilities are talking about and we are working on in Massachusetts. So long story short, yes that's awesome – not yet, but these systems will be in the future if desired compatible with the battery.

Alderman Dowd

OK I may have added questions but I will let somebody else ask some.

Mr. Hasselbeck This has been fun for me though.

Alderman O'Brien

Thank you to Mr. Hasselbeck you sparked my interest with the, no pun intended, with the fastening type of system. Basically what I am concerned about is like you say I want to focus on the ballast system. We do live in New England and I understand it is the weight of the ballast that holds it to the roof. So what are some of the engineering, we do get the occasional hurricane, I understand we are not in tornado alley. But then again I could understand that all bets are off with a tornado, but with the New England Nor'easter and everything else like that how does the ballast system really stand up in this type of weather climate?

Mr. Hasselbeck Yeah really well so we look at you know local snow loads, local wind loads. So the same type of design criteria that a new building has to be put through, you know with the specific wind loads for this town, this City, building height is a factor, whether there are parapets or whether it is a flat roof, the proximity of the solar rays to the edge of the roof. If you saw on our designs, there's a four foot gap between the edge of the roof and the beginning of the solar panels, that serves two purposes. One for that maintenance and fire access if needed; two, it actually significantly reduces the loading on that system. The other thing is that we are not looking, all these panels are connected in a large horizontal basically. So we get the benefits of this basically large kind of interconnected entity, instead of just one individual solar panel at a time. So I'd be happy to get into the weeds on all the calcs that get done to make sure that they don't blow off, but I've never lost one yet and I sure as heck don't plan to in downtown Nashua.

Alderman O'Brien

And I left my PHD at home so you don't have to get into the weeds. But it is a concern, New England like they say, "wait a minute, the weather will change". To that, do you also look at in a ballast type of system you look at the insulation of the building that you put it on. I did have a failure of a structure because people at a later date over-insulated. And when they over insulated then there was no wicking of the snow or no melting and it kept the snow on until finally the roof caved in. So do you do the usual caveats with that and you look at each engineering standards as is and not to any architectural changes?

Mr. Hasselbeck You got it, so that's exactly why we do all of our own project specific, engineering review is part of our due diligence just to make sure. Because that happens a lot especially with older buildings, is that things get added. Oftentimes what we see is actually additional HVAC units either hung from rafters or put on top that weren't included in the original designs. That's why it is really important to us that we do our own due diligence just before installation so we capture any changes or alterations to that building that happened post-construction to make sure that what we are doing doesn't compromise the structural integrity.

Mr. Weeks I would just add Alderman O'Brien as an interesting test case, a couple years ago Hurricane Sandy was probably the biggest challenge to install solar. You had a substantial amount of solar penetration in New Jersey and New York State. There were a number of roofs that came off, but no solar came off roofs. There were some roofs with solar that were lifted, but I don't think a single panel was loosed in that particular Super Storm and we have so far had a clean track record here in Northern New England.

President Wilshire

I have a question about the end of life for these panels, what happens then?

Mr. Weeks Great question briefly and James feel free to add. So the power purchase agreement which we will get into momentarily here, actually stipulates that if the City opts not to purchase the array, the panels, then the full installation from the investor partner, it is the investor, the owner of the arrays responsibility to remove the panels and to return the facility to its prior condition absent normal wear and tear. So that is not the City's responsibility unless you choose to own the array. To be honest, we have a so far small test case because the commercial lifespan of solar equipment is 40 plus years. We have systems that are reaching 40 and slightly beyond 40 years old in this country and they are still putting out about 80% of their initial Day 1 power. So as of this point, there is not much a secondary market because there is not much to feed that market. We do certainly anticipate that in the coming years and certainly decades that will emerge. The primary ingredients in solar panels are reusable, valuable commodities; glass, silicon, aluminum. Just how they will be repurposed presumably into new solar panels remains to be seen but that is certainly emerging.

Mr. Hasselbeck And I do think that a better case study is the European Market which is far more established and mature than the US market and there is a little cottage industry focused on the purchase and recycling of solar panels and associated equipment at the end of their lives. So again it is not poisonous chemicals, it is glass, aluminum and inert silicon. So there will be a value and a market for it.

Alderman Lopez

So just two quick questions, the first one is we were talking about how much this would offset expenses in terms of power use. Given that these are absorbing sunlight coming down on a roof, would there be a reduction in cooling costs during particularly hot days?

Mr. Hasselbeck Yes is the answer which is kind of an ancillary benefit to solar rays because you are right, these things are designed to suck up solar energy. We have done some really neat studies especially over these past few weeks where it has been so hot in taking our flare guns and measuring temperatures of the solar panels versus temperatures of the roof surface underneath. UV rays and heat are two of the biggest factors in roof wear and tear. So they are much cooler which reduces cooling costs. What we can't do is quantify exactly how much cooling load we are going to reduce. So because we can't quantify it with 100% certainty, we don't include that in any of our models. But the benefit is there, it is real. We can show you differences in temperatures and thermal imaging, but I can't say this will also save the City X thousands of dollars in cooling costs.

Alderman Lopez

And just my final question is you had, in discussion with Alderman Dowd, you said other climates have a higher level of, your implication I think was that there is a higher level of sunlight?

Mr. Hasselbeck Yes it is something we call irradiance levels. So irradiance is the measure of watts per meter squared but we are not in a terrible spot. The best predictor of solar production is your latitude lines, right? So your latitude line is a really good predictor so you see down by the equator, that same solar panel will generate roughly 30% more energy than it will up here in New Hampshire. But here in New Hampshire they still do pretty good and if you follow the latitude line straight east to Germany; Germany has one of the largest solar markets in the world and they are able to meet what? Was it 50% plus?

Mr. Weeks On peak, sunny windy days the entire German Economy, the 4<sup>th</sup> largest economy in the world is virtually 100% solar and wind powered. They actually have 30% less solar insolation or irradiance than we do here in New Hampshire at a higher latitude and yet they've been able to achieve that substantial benchmark with a couple decades head start over this region.

Alderman Lopez

So we do OK but basically what you are saying that compared to equatorial regions, New Hampshire is not as bright?

Mr. Weeks That is true as my wife bemoans often but nonetheless a lot of solar output.

Mr. Hasselbeck Bright enough.

President Wilshire

Commissioner do you have questions?

Fire Commissioner Paul Garant

I have one question and it may be more esthetics than technical but when I saw the inverters, the slide with the inverters – one I wanted to know are they all mounted externally or are some mounted internally?

Mr. Hasselbeck It depends on the project. So we can do either; in this case we have all examples. So all the inverters are rated to be mounted externally, so if we need to put them outside, that is what they are designed for. If in the top left, that's the case where we had some spare space available in an electrical/mechanical room. If that's an option, we'd love to take that option. Another option on the top right, we mounted those inverters right on the roof surface itself, so that's another option. So if esthetics were a concern we could include.

Commissioner Garant

My concern is the array of conduit on that building surface which after you have designed the building to make it look esthetically pleasing, particularly a Fire Station, then we end up with 20 rows of conduit. Is that always necessary?

Mr. Hasselbeck Yeah it's a great question. No it's not, so first of all esthetics actually does play into our design because we firmly believe that our solar adoption rate is 1% so there is a lot of opportunity there. These municipal projects are so valuable because they are offering community residents first exposure to solar and if it looks ugly that is not going to be a positive experience. And that doesn't help anybody, right? In that specific case, that's actually in the City of Keene, that system is gigantic so it is a massive power plant. That specific location is on the rear of the building sandwiched between the dumpsters and where they park the Zamboni. So we do take that into account. I want to be clear, we are electricians not magicians and we do have to connect our solar arrays to the inverters but I am not looking to put all that stuff right next to your front door, I guess.

Mr. Weeks And I am happy to advise on these specific properties because these are substantially smaller arrays there is sufficient room. I think the plan, it hasn't been all confirmed, we are still in that process working with the managers of those facilities, but the plan is to locate those two or three inverters, not the 8 or 10 that you see on larger arrays in those utility rooms and run interior conduit runs. That's always our preference from an esthetic standpoint and we should be able to do that in these cases.

Commissioner Garant

Thank you.

Mr. Weeks Thank you Commissioner.

Alderwoman Kelly

Thank you. We touched on maintenance of the panels. Is there any concern or issues that come up with the roof maintenance once something is installed?

Mr. Hasselbeck Another great question that's why we really feel strongly about due diligence prior to a solar installation to essentially avoid major roof maintenance there. But in the case where this is say, what does happen sometimes you know we saw the HVAC units up there. That is often, those heating and cooling units typically do have penetrations, those are often the locations for roof leaks or areas of the roof that need maintenance in the life cycle of a building. So our first approach is to avoid getting too close to those. But in the event where you know we did need to move some panels, it is not a big deal to move a few solar panels. It is a big deal to remove all of them for a big re-roof. So a simple roof leak if that happened, you know, we are moving only a handful of panels in that specific area so that's very minimal exposure and very minimal cost.

Mr. Weeks And it is worth noting Alderman Lopez asked the question about the roof condition, in addition to reducing cooling loads by exactly how much we don't know, hence not included in the financials, it will extend the roof life. Those UV rays are the primary cause of the degradation of the roof itself. So covering that up, soaking up those rays instead as the panels are designed to do, will have that additional benefit.

Alderwoman Kelly

And just to follow on, as we are starting to look at building projects, I would just be interested to know what we can do to make it more solar friendly. So we have the Performing Arts Center coming up, we are talking about a new school, what kinds of things can we do to make sure that they are solar friendly even if we don't install it right at that time?

Mr. Weeks Thank you so much for looking ahead and thinking ahead in that way and I would note to Alderman Dowd's question that we have had some conversations with members of the School Department and done some preliminary designs. The two high schools each have capacity for about a megawatt, that would be ten times the arrays you see here, so tremendous potential in the City in the future. I would say the short answer Alderwoman Kelly is we are always grateful to be brought in early in the process. We are often working with several municipalities and businesses, putting up new buildings at this point in time and advising their electrical contractors on conduit runs, on spacing for inverters in the utility rooms so they don't need to go outdoor preferably, on roof type selection. So that is something obviously unique to a given project and their needs but we are eager to provide that guidance at the get-go and certainly can do whether or not we are a chosen vendor. We are happy to provide that input.

Alderman Dowd

Any new design building like the new school, the Performing Arts Center or anything like that, the architect and the construction manager do a lot of the planning to allow for the solar array and they have a lot of that responsibility to make sure it is done correctly and esthetically. So they would work with a solar company to perform all that work but they'd do it in accordance with the drawings that they come up with.

Alderwoman Kelly

I think my question was if we were planning on it then definitely that would happen but if we are not and we are just putting up a new building, are we at least thinking ahead and putting in roofs that can actually sustain this?

Alderman Dowd

Oh no we are way ahead and we are doing solar.

Alderwoman Kelly

OK.

President Wilshire

Anyone else? Thank you very much gentlemen, appreciate you being here. Oh you still have more presentation. The financials.

Mr. Weeks I will move swiftly through this, naturally we certainly invite questions and appreciate the chance to answer them as you've given us so far. Let me just briefly preface, I'm fortunate to be a local citizen and tax payer here in Nashua. We deeply appreciate and respect, speaking on behalf of a company whose mission it is to accelerate this transition from fossil fuel dependence to clean energy. We deeply appreciate and respect that the Energy Committee here in Nashua has proposed to the Aldermen and I believe the Aldermen have accepted their recommendation that the City move toward 100% clean energy. A very exciting goal that now many communities across New Hampshire and the Nation have adopted.

Naturally, we are always thrilled to work with communities that have environmental goals as their primary motivator but the financials matter too; speaking as a local citizen as well. So at the outset, when we are approaching a project of this sort and frankly 9 out of 10 projects that we develop, we want to ensure at the outset that this will provide a financial return to the community and to the business, whoever it may be. The primary mechanism to achieve that with a municipality or any other non-profit, tax-exempt entity is what is called a power purchase agreement. To give a couple of the kind of summary facts on power purchase agreements, the challenge that we are seeking to overcome with PPA's is that in their wisdom the Federal Government has chosen to direct all incentives for solar, federal incentives, through the tax code. That means if you are homeowner or a business owner and have a tax bill to the IRS you can take the 30% investment tax credit that the Mayor alluded to, which steps down at the end of this year. You can depreciate the asset if you are a business, but if you are a non-federal tax payer, such as a municipality, you have no access to that directly.

The solution which was developed, in fact, by the Federal Government, the National Renewable Energy Labs at the Department of Energy over a decade ago and has been blessed by the IRS which is, in fact, the primary mechanism by which large-scale solar has been implemented in the United States is this power purchase agreement. As the name suggests, the City is not purchasing the array, the capital expense for the panels, the inverters, the racking, etc., the City is purchasing the power that the array produces and feeds to its facilities at a rate below the current utility rate. What this looks like is you have investors on the one hand who are providing the capital to finance these projects and I'll show you what those specific numbers are on the next slide. They are owning and operating the array, contracting with ReVision with James' team to provide the O & M once we have fully installed the system and permitted it. They are recouping their investment through that Federal Investment Tax Credit and depreciation and some very modest environmental attributes renewable energy credits and crucially from the sale of the electricity it produces to the City at that below market rate.

For the City's part, the City is licensing the use of those two roofs and potentially future roofs or ground areas for the purpose of installing solar. It is committing to buy the power from the array at the rate schedule set out in that PPA contract. In order to maximize its long term savings, after 5 years, which is the minimum period of time the investor must own the asset, it is the IRS recapture period on that tax credit; short of five years the investor must return those tax incentives on a pro rata basis. But once we reach Day 1 of Year 6, the City may and is in fact encouraged to for its financial benefit, acquire the array at a substantial discount and then generate its own power going forward for the next 30 to 40 years.

The specifics for these two projects would be an initial cost to the investor of just over \$500,000.00 and upfront cost to the City of \$0 because again you are not owning the array, you are simply purchasing the power from the array. In order to make the investor whole and I'll say a word about the investors that we are fortunate to work with, the City would be purchasing that power at a starting rate of 8.8 cents per kilowatt hour, rising 2% annually

thereafter for the duration of that PPA contract. Again, minimum 5 years; standard term of 25 years but those buy out options are annual beginning in Year 6. So the City determines for how long they remain in the PPA.

If you were to exercise that option at the earliest possible point in Year 6 there would be a capital expense of just over \$300,000.00. That amount is pegged to fair market value as required by the IRS so the amount declines each year thereafter. If the City were to defer that buyout as it may choose to do in that given year, you aren't required to commit upfront, but once again the sooner you own the asset and are generating your own power the greater the long term benefits. And then assuming that the City does exercise its buyout option in Year 6, the net savings, so this is deducting the cost to buy it out at \$300,000.00; the cost to maintain it were you to contract with ReVision for this optional Operations Maintenance Contract; the modest degradation factor, we model in a loss in production of half of 1% per year; hence a 40 year old system at 80% as we see today on systems in the ground. We build in these factors, I noted earlier a full replacement of the inverters midway through the system life, very conservative assumptions around utility, inflation and renewable energy credits. Put all this together and our conservative estimates on savings for the City over the 25 year warranty period come out to a little under half a million dollars. And then if you extend out to the minimum commercial life span of 40 years, \$1.27 million dollars.

To represent these numbers graphically for a moment, you see in the yellow line that is the solar PPA with that early buy out in year six. So you have modest initial savings and we can circulate the more detailed financials, but the City is purchasing the power from the array, that 8.8 cent rate is approximately 20% below current utility costs. So you are saving roughly 20% on each kilowatt hour provided generated by the solar array. So relatively modest initial savings without any capital cost. Were you then in Year 6 to buy out at about \$300,000.00, you would be payback sort to speak of between Year 6 and Year 12 or 13 of approximately 6 ½ years to recoup that investment and from that point forward your savings are accumulating to the long-term figure of \$1.27 million.

The blue line there is if you were to – your worst case scenario if you will, that is if the City determined to never allocate the capital, to purchase the array; simply took that Power Purchase Agreement to the full 25 years and then acquired it at a very, very low cost after 25 years, your long-term savings would be less but still strongly positive. Just a final way of representing these same numbers which we think is worth understand and please pardon the label. Initially we did present in the RFP for 5 sites, we are currently at 2. So on the right you see the status quo scenario. So for these facilities which are Eversource Rate Class G, General Commercial the current rate, the current cost of that electricity, when you factor in not just the supply, but the transmission, distribution, costs all the line items on your bill that are charged on a volumetric basis per kilowatt hour, the current is about \$0.123 cents per kilowatt hour. To the left the utility line in gray is if we take the Federal Government projections on utility cost inflation over the next several decades; the US Energy Information Agency projects for New Hampshire, an average 2 ½% per year inflation. We have seen more in recent years, about 3% going back the last 15 years. We think it is prudent and conservative to use the Government projections, a bit lower than that going forward. So those are your utility status quo scenarios in that assumption an average cost over the next 40 years of that power of just over 20 cents per kilowatt hour.

While those are projections, the numbers on the left we can have a lot of confidence in. We know the size of the array, the power output based on the modeling that our engineers do through Helioscope as we have described. We know that the cost to operate and maintain the arrays, the cost of the buyout, the degradation factor, building all of this in, we arrive at on the left a long-term leveled cost. So an average unit cost per kilowatt hour over the lifespan of the solar equipment of \$0.057 cents if you exercise the early buyout of \$0.085 cents if you do not buy out at any point but go the full 25 year term. Or were you to purchase up front \$0.058 cents but naturally that would require a significant capital outlay at the beginning without the flexibility to determine at a future point if you choose to own it or not.

So that's the financial summary. I am happy to take any questions you may have there and that really is the substance of the proposal so we don't want to take too much more of your time.

President Wilshire

I didn't mean to cut you off.

Mr. Weeks It may just be worth if I may I recall one more slide that I threw in here and then we can talk a little bit about kind of community engagement if you wish. But as to where that capital comes from, something that ReVision takes a lot of pride in as part of our Mission as a Certified Benefit Corporation is extending – so we are making solar available to non-profits and municipalities that in New Hampshire's context with very limited State incentives, would otherwise not have an opportunity to go solar. When you read about utility scale solar projects the financing in almost every case comes from Wall Street where they are able to earn market level returns, particularly if it is a State like California with substantial additional State incentives. In New Hampshire for smaller scale projects with limited incentives, there unfortunately is not a commercial PPA investor market. We just can't sell these projects except rarely at very substantial scale. Projects at this size, simply don't have financing available in the existing solar investor market. Consequently what ReVision has worked to do over the last several years beginning as a kind of proof of concept on our own balance sheet by directly investing in and owning upwards of 70 non-profit power purchase agreements for various non-profits around the region. But in the last 2 years, in order to bring added scale we have recruited and partnered with a number of mission-aligned investors including for this project a family that lives here in this community and works in this community that is blessed to have a large tax bill to the IRS which they through such an investment have the opportunity to essentially redirect by investing that capital in solar projects, taking advantage of the existing tax incentives and providing much lower cost financing than is otherwise available.

We call this program ReVision Solar Impact Partners, we have so far built over 120 of these PPA's for other municipalities and non-profits like the Soup Kitchen. That is why we believe or perhaps part of why we have the opportunity to work with many smaller community organizations and smaller municipal projects thanks to these investor partners who share our mission of deploying solar at lower cost. Let me shut up with that and welcome any questions you may have on the finances.

Alderman Clemons

Yeah so when you did the .... because I know the City bulk purchases power, so when you did the market analysis, did you factor what the City purchases power at in to your analysis?

Mr. Weeks We did. Because these two facilities will be net metering facilities they are not required to register as net metering but because there will be excess production in peak summer months, they will under current regulations require, will have to revert to default supply which would add were they purchasing net power would add between a penny and two pennies per kilowatt hour. And Bob Hayden is the expert in the competitive supply market and he can speak in more detail. So for these two facilities, they will require that reversion to default supply. For your interest perhaps, as we look at larger scale projects at the airport or other offsite locations which would be directly fed into the grid, they would through group net metering off set multiple City accounts, but each of those participating accounts in such a group would retain the ability, as they do today, to purchase that power on the third party competitive supply market rather than going to default. So default makes sense in a situation like this where you are providing most of the power on site, so you are getting not in fact from Eversource but from your own rooftop. And for larger scale projects we approve net meter to avoid that requirement.

Alderman Clemons

OK. If I could continue? Knowing that makes you know I think, I'm glad that that was factored in because I think this is for me anyway, this is no-brainer because it is no upfront cost to the City and regardless of whether or not down the line we purchase the array on top of these buildings, we are going to be saving money. So as somebody who is responsible for making sure that we are doing everything we can to save the tax payer a dollar, not doing this would be foolish. So I certainly will support this project.

President Wilshire

Any other questions?

Mr. Weeks Well thank you so much, we threw a couple of just feel good in terms of community engagement, James briefly mentioned that we love to come into the schools and educate. That moderating platform can be made available to the entire community. And so we hope that if we have the opportunity to complete these installations we can serve as a partner educating the community and helping to achieve maybe in my humble opinion the most important slide here is the actual environmental benefits as a concerned citizen with young kids as many of you, with kids or grandkids. These projects alone would have a very meaningful environmental impact in terms of carbon pollution reduction. We thank you so much for your leadership and the opportunity to present.

Mayor Donchess

Madam President, I think there are two things we should cover. Number 1 how soon does this need to be approved in order to make this definitely feasible for this year. And Number 2 I was thinking we might ask Mr. Hall who is representing Conway and their participation, these financials rely on their participation as well. Maybe let him, Mr. Hall address any, I mean I know it is generally supported, but there is the lease issue, maybe let him address this a little on that.

Charles Hall, President Board of Directors Conway Arena Charles Hall, 37 Chestnut Street, President of the Board of Directors at Conway Arena. Thank you for inviting us. Representing our Board is Jim Conway, Tom Monahan, Morgan Hollis, Brad Craig and Joe Bellevance Jr. So approximately 2002/2003 we entered into an agreement with the City to build Conway Arena. We took a parking lot next to the DPW and built a beautiful facility. It was approximately a \$3.7 facility; we have a note of about \$1.2. We are well on our way to paying that off. Why we would like to extend the lease, so we have a 30-year lease. And with the addition of the solar panels which is a great thing, this now gives us the ability in year approximately 2023, that 6<sup>th</sup> year that Dan talked about of buying the array out for about \$490,000.00. So in year '23 we would probably want to take another note for that, whether we need to take the full amount of what but this would be longer than a 7 year note so this gives us that flexibility to do that. Also, although you said the roof will last forever? It probably will but we'd like the flexibility that if at year '30 we need to replace the roof, it gives us that flexibility as well. So what we would really like would be an additional 20 years which would make it a total of 50.

In giving back and hopefully everybody here agrees that we've been a real community supporter and have done a good job as stewards for the arena. Alderman Caron and Mayor Donchess were at our event last week when we gave over \$50,000.00 as you mentioned, which actually now totals since 2004 we've give over \$760,000.00 to local nonprofits, Boys & Girls Club, Nashua Y, Police Athletic League, Fright Night.

You've got to do Fright Night. Marguerite's Place, Adult Learning Center, you name it, Nashua Soup Kitchen, Grow Nashua, so you name a local Nashua non-profit and we've given money to it. So I think we'd appreciate the extension. It would just help us be a full participant of this project.

Alderman Clemons

Thank you. I completely understand that from a commercial lending perspective you have to have that lease in place in order for a lender to give you that loan. You know a few years ago when I was on the Board we did that for the Airport Authority and we did that for private citizens who had hangars and different things that they wanted to do; get loans for that they were unable to so we extended that out for 99 years I think. But I certainly would support extending a lease and I, you know, like you said everything you have done for the community has been great. I think the mission there has been achieved and I can't see needing to really discuss many major changes to that lease. So as long as we are under similar terms, I think I could support something like that.

Alderman Jette

So forgive me for asking but it's the only way I am going to find out. Somebody said, unless I misunderstood that you get like a \$650,000.00 profit. Did I hear correctly is that true?

Mr. Hall I wish it was true. If it was we'd give it right back to the community. No, no what I think you remember is Mayor Donchess and I corrected him, over since 2004 we've given out \$760,000.00 over that amount of years, approximately \$50,000.00 a year.

Alderman Jette

May I continue? So is Conway, are you guys doing this as a service to the City, whatever you take in it pays off your expenses, you've got the note to service and you guys personally are not making any money.

Mr. Hall No, no no.

Mr. Hall For full disclosure I own an HVAC Company I do work for the City, I do work at Conway Arena, I do work for the Boys Club so there is a little of that but we don't, we give everything out to the non-profits, we put money into a reserve. Two years ago we put new rubber flooring in all the locker rooms. Last year we bought a new Zamboni to replace the original; that was \$100,000.00. This fall we are redoing the rest of the rubber flooring. So I certainly encourage you to go by and take a look at it.

We take a lot of pride in it but all the money that we make at the end of the year, just like you said, goes to the non-profits, goes to the mortgage. We put some in the reserve just for these type of expenses that come up. But none of us make a salary or get paid or anything for our involvement with the arena, it is truly a love for the City and hockey and figure skating.

Alderman Jette

Well thank you for clarifying that.

Alderman Lopez

Maybe some of the more experienced Board Members or the Mayor could tell me but I can't actually think of something that the City owns in terms of entertainment value which isn't typically better managed by somebody like I'm thinking of Holman Stadium. On the other hand I'm thinking of the Arts & Sciences Building which we tried to run and didn't do so great. So I feel like if we have somebody who is leasing it and doing major service to the community both financially in terms of donating to non-profits, but running it effectively in the way that it is supposed to run, I'm in favor of supporting them too. If all they are asking is the ability to improve the facility to the extent that we can save money on electricity for it.

Alderman Dowd

Question for whoever wants to grab it. I am going to assume we will need legislation and if so, has it been drafted yet and does it need a sponsor and how quickly can we get it in the pipeline, Mr. Mayor?

Mayor Donchess

I think it is simple legislation that could be prepared for the meeting of August 13<sup>th</sup>.

Mr. Weeks If I may Mayor, just to your question about timeline and thank you so much Mr. Hall and the Board. Just very briefly economies of scale certainly do count. The 8.8 cent PPA rate is not something that we would be able to offer and cover our cost or the investor's cost without the participation of Conway Arena at a 400 kilowatt, so 4 times roughly the size of the individual projects currently in play for the City. So in terms of timeline we are blessed to have a lot of demand particularly with the sun setting of the tax credit. So with James and the team are doing a lot of juggling of priorities, we want very much to complete this this year but we are pushing up toward some major procurements that we need to make of panels and racking etcetera and we cannot make those major procurements until we have this signed contract.

We understand that there is a process with the Board of Aldermen but we hope very much as we have relayed to members of the staff here that that can be fully finalized and signed in the month of August so that we can stay on track for a fall installation.

Alderman Dowd

Can we have the presentation added to the minutes of this meeting so that the people that aren't here tonight can have access to it?

Mr. Weeks We would be pleased to share it.

President Wilshire

Thank you so much.

Alderman Clemons

So given what Dan just said with the month of August I would assume that we would need a special meeting.

President Wilshire

Because we only have one meeting in August.

Alderman Clemons

So we would need to consider that I guess.

President Wilshire

We will schedule a date.

Alderman Clemons

Sounds good.

President Wilshire

Director Marchant, did you have something to add?

Sarah Marchant, Director Community Development

You do have two meetings in August, don't you have a second one later this month on the 20th?

President Wilshire

No we only meet once in July and once in August.

Ms. Marchant

So we will be looking to find out which Committees are most likely to be referred to see if we can get those set up for early September.

President Wilshire

We will work on it expediently.

Alderman Dowd

We just moved two budget meetings to account for some other legislation. So the two budget meetings are going to be September 5<sup>th</sup> and I think the 11<sup>th</sup>. Excuse me, nope that's wrong. So the August 26<sup>th</sup> Budget is going and I don't know if this has to go to Budget or not but it is going to September 5<sup>th</sup> and the September 23<sup>rd</sup> is going to September 16<sup>th</sup>. So one is being pushed back and one is being moved up.

President Wilshire

We will work it out with our Legislative Manager.

Alderman Clemons

Yeah I was going to say that it has to be done this month it can't move into September.

Alderman Dowd

We are moving the meetings for other legislation reasons some of which you are very interested in.

President Wilshire

We will find the dates; I assure you we will it's a good project and thank you.

Mr. Weeks Just to be very clear, so I am the construction guy so forgive my ignorance to the political process. It is an accelerated timeline, that is not because we are trying to force a decision; but it is because it takes time to build these things. And some of these things are outside of our control. The way that the tax law works it's not just my team building that project, it has to meet something which is called "Utility Permission to Operate".

So even after my team finishes the actual construction, there are another few weeks of stuff that Eversource and Unitil and the utilities that we have to do. And if we do not get that all completed and all our T's crossed and our I's dotted by September 31<sup>st</sup>, that tax credit goes down, meaning the tax credit to the investor goes down meaning that the savings to the taxpayers of Nashua also go down. I just want to build stuff so anything that can be done to allow my team to spend, I also have to spend roughly \$270,000.00 to write checks to make this happen and I would love the certainty before I spend that money that this project is going to come to fruition.

So I just wanted to clarify that is where the time pressure is coming from not our desire to be greedy, but basically it actually provides a better financial return to the taxpayers of Nashua. Thank you.

President Wilshire

Understood, thank you very much for that clarification, really appreciate that. And we will make this work, we will make the timeline work anyway.

Alderman Lopez

The sooner he gets to build stuff the sooner we save money on it.

Mr. Weeks That's also correct.

President Wilshire

Anything else? Mayor? Nothing else to add?

Mayor Donchess

I have nothing else. Thank you.

President Wilshire

Well thank you very much for being here this evening, we appreciate your presentation.

NON-PUBLIC SESSION

**MOTION BY ALDERMAN O'BRIEN THAT THE BOARD OF ALDERMEN GO INTO NON-PUBLIC SESSION BY ROLL CALL PURSUANT TO RSA 91-A:3,II(d) FOR THE CONSIDERATION OF THE ACQUISITION, SALE, OR LEASE OF REAL OR PERSONAL PROPERTY, WHICH, IF DISCUSSED IN PUBLIC, WOULD LIKELY BENEFIT A PARTY OR PARTIES WHOSE INTERESTS ARE ADVERSE TO THOSE OF THE GENERAL COMMUNITY**

**SECONDED BY ALDERMAN LAWS**

*A Viva Voce Roll Call was taken, which resulted as follows:*

Yea:	Alderman O'Brien, Alderman Gidge, Alderman Dowd Alderman Laws, Alderman Lopez, Alderman Caron Alderwoman Kelly, Alderman Jette, Alderman Tencza Alderman Clemons, Alderman Wilshire	11
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Nay:		0
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**MOTION CARRIED**

*The Board of Aldermen went into non-public session at 8:50 p.m.*

**MOTION BY ALDERMAN O'BRIEN TO COME OUT OF THE NON-PUBLIC SESSION AND RETURN TO THE SPECIAL BOARD OF ALDERMEN MEETING  
MOTION CARRIED**

**MOTION BY ALDERMAN O'BRIEN THAT THE BOARD OF ALDERMEN SEAL THE MINUTES OF THE NON-PUBLIC SESSION BY ROLL CALL UNTIL SUCH TIME AS THE MAJORITY OF THE BOARD VOTES THAT THE PURPOSE OF THE CONFIDENTIALITY WOULD NO LONGER BE SERVED**

*A Viva Voce Roll Call was taken, which resulted as follows:*

Yea:	Alderman O'Brien, Alderman Gidge, Alderman Dowd Alderman Laws, Alderman Lopez, Alderman Caron Alderwoman Kelly, Alderman Jette, Alderman Tencza Alderman Clemons, Alderman Wilshire	11
Nay:		0

**MOTION CARRIED**

ADJOURNMENT

**MOTION BY ALDERMAN O'BRIEN TO ADJOURN  
MOTION CARRIED**

The meeting was declared adjourned at 9:09 p.m.

Attest: Patricia Piecuch, City Clerk