2019 ENERGY MASTER PLAN
STAKEHOLDERS MEETING

SUSTAINABLE AND RESILIENT INFRASTRUCTURE

BOARD: CYNTHIA HOLLAND, Lead, BPU
JOSEPH DeLOSA, BPU
ZAINAB NAWAZ, BPU
STACY PETERSON, BPU
JAMES GIULIANO, BPU
DAVID BROWN, BPU
MEGAN LUPO, BPU
BEN WITHERELL, BPU
JOE COSTA, BPU
MARCO VALDIVIA, BPU
CHRISTINE SHCELL, DEP
ATHENA SARAFIDES, DEP
MONIKA ATHWAL, EDA
MAGGIE PETERS, EDA
MATTA SESTRICH, EDA
DIANA BUTCAVAGE, EDA
BRENDAN McCLUSKEY, DOH

DATE: SEPTEMBER 28, 2018

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THE CONFERENCE ROOM
1200 Old Trenton Road
West Windsor, New Jersey

BY: Laura P. Ream, Court Reporter

J.H. BUEHRER & ASSOCIATES
884 Breezy Oaks Drive
Toms River, New Jersey 08753
(732) 295-1975

A P P E A R A N C E S:

A P P E A R A N C E S (Cont.):

MS. CYNTHIA HOLLAND: Good morning, everyone. For those of you who don't know me, my name is Grace Power. I'm the Chief of Staff at the BPU. Welcome today to our fifth, no longer final, stakeholder meeting of the Energy Master Plan Committee. Welcome on behalf of President Fiordaliso and Governor Murphy. I'm excited to be here today to introduce the Sustainable and Resilient Infrastructure Committee.

As many of you know by now, the Executive Order 28 was signed by the governor in May along with the clean energy legislation, the nuclear legislation, at which time he tasked the BPU to spearhead an Energy Master Plan Committee that will deliver a new 2019 Energy Master Plan, and that is what we have been hard at work doing.

Ultimately our task is to develop a blueprint for the full conversion of the state to 100 percent clean energy by 2050. So we have a big task ahead of us, but we're excited to take all of your input to

get us there.

Brief timeline, again the executive order was signed in May. The interagency Energy Master Plan Committee kicked off in June. We've been holding our first set of stakeholder meetings this month with two additional meetings that were just announced in October, the 4th and 11th [sic]. I believe we have copies of that notice here. The information is also available on our website.

We heard you all tell us that we needed some additional hearings, so we scheduled them. Some people were prepared to congratulate me on surviving the first five hearings, but two more to go.

After that point the committees are going to be working to put together a draft that will be released late winter, early spring for public comment with a final plan to be delivered to the governor in June.

The departments, many of whom are represented here today, that are involved in the EMP process, of course, the BPU

staff, DCA, EDA, DEP, Health, Human Services, DOT, Labor and Workforce Development, Treasury and Transit.

With that I am going to turn it over to Cynthia Holland, who is the director of the BPU's Division of Federal and Regional Policy. Thank you.

MS. CYNTHIA HOLLAND: I'm not sure which side I'm supposed to click, so you're going to have to work with me for a second. But I want to thank everyone for being here today. This is no longer our final stakeholder meetings, so you do have two more opportunities to have your voice heard before our October 12th deadline for comments.

I did want to take a brief moment to introduce to you the Sustainable and Resilient Infrastructure Committee. I have several of my colleagues sitting here today.

Do you guys want to go down the line and introduce yourselves briefly?

As you know, I'm Cynthia Holland. This is my colleague.

MS. MEGAN LUPO: I'm Megan Lupo from counsel's office.

MS. ZAINAB NAWAZ: Zainab Nawaz, BPU staff.

MS. CHRISTINE SCHELL: Christine Schell, Department of Environmental Protection

MR. BRENDAN McCLUSKEY: Brendan McCluskey, Department of Health

MS. DIANA BUTCAVAGE: Diana Butcavage, Economic Development Authority.

MS. ATHENA SARAFIDES: Athena Sarafides, New Jersey Department of Environmental Protection.

MS. CYNTHIA HOLLAND: And we do have other colleagues sitting in the office. So I appreciate your attendance. And so let's see if I can do this.

Our next two stakeholder meetings, as Grace mentioned, are October 4th and October 10th. The October 4th meeting is going to be in the evening at Seton Hall, and the notices, as Grace mentioned, are in the front. We also have another one on October 10th at Camden.

And, finally, just a reminder that if you haven't submitted your comments already, there is the final comment deadline on October 12th at 5:00 p.m., so we welcome your comments.

And now just before we get started just simple housekeeping for speaking. We do have a long list of parties that have interest in speaking to here today. I will do my best to announce your name, so please, you know, have some sympathy for me.

And when you come to the microphone -- sympathy not only for me, but also for our lovely court reporter. Please restate your name and, if appropriate and necessary, please spell it slowly for our court reporter and state your affiliation before you make your comments.

Also, in the interest of moving this hearing along, it's a Friday afternoon, and I know that there are many people who want time to speak today, we would like to hold you to no more than ten minutes, so we will be timing you. And as

appropriate, we will be breaking at certain periods. So if you no longer want to speak, please inform the BPU staff at check-in, or if you are late arriving, please just make sure that you do check in, although you probably wouldn't have heard that if you're late arriving. But anyway, so please just help us out. And we do have the two microphones for you to speak, and without further ado, let's get started.

So first on our list today we have -- so I'll call two names, so we can have one speaking and one on deck, because I liked that format. So we'll have Lawrence Furman and Anthony Megaro. So do I have these gentlemen in the room? Going once, going twice?

(No response.)

Michael Egenton? And then after Michael Egenton, our speaker from the NJ State Chamber of Commerce, I have Steven Westoven from New Jersey Natural Gas.

MS. LAURA HAHN: I'm here on behalf of Michael Egenton. Unfortunately he couldn't make it last minute. My name

is Laura, L-A-U-R-A, Hahn, H-A-H-N, and I am the director of permit relations at the New Jersey Chamber of Commerce. Would you like the copies right now?

MS. CYNTHIA HOLLAND: You can leave them there. That's great. Thank you,

MS. HAHN: So thank you for allowing us the opportunity to provide input on the Energy Master Plan.

Since 1911 the State Chamber has been recognized as the independent voice of business in New Jersey. With a broad-based membership ranging from the Fortune 500 companies to small proprietorships, representing every corner of the state and every industry, our members provide jobs for over a million people in New Jersey. We continue to work toward streamlining the regulatory process while striving to maintain the economic vitality of our members and the quality of life that makes New Jersey unique.

Energy is the lifeblood of the economy. Reliable, safe, reasonably-priced

and environmentally sound energy supply is essential for New Jersey's economic progress. The State Chamber supports a balanced approach toward achieving the EMP goals that doesn't depend or rely on one method, one technology, one fuel source, or overburden one segment of the economy or group of energy consumers.

The reliability and resilience of our energy, along with our transportation systems, are key to our businesses and their operations in the state. We support continued efforts in strengthening, modernizing, and updating our aging power grid. We recognize the need for such investments, and like any other long-term solution, the management and financing of such investments require thoughtful, but structured, more predictable deliberation.

I want to take the opportunity to highlight some of the specific energy sectors our organization believes must be "on the table" as the State of New Jersey prepares for the energy needs of the business community and residents in the

outlying years.

In-state generation. The State Chamber recognizes that electric transmission resources are essential to maintain the reliability, efficiency, and safety of the electric system. Transmission additions and upgrades are also elements of a balanced approach to meeting the needs of energy consumers.

The ability to move power throughout the state and the region and to resolve congestion on the system that affects reliability and increases costs remains an important goal. New transmission construction also is an economic driver in its own right that will create jobs directly and through associated economic activity.

That is why the State Chamber has actively supported projects like the Susquehanna-Roseland transmission upgrade because it so critical to the future success of our economy and the energy needs of our citizens.

Natural gas. New Jersey must

continue to cultivate a natural gas-friendly environment. Natural gas is economically efficient and is a clean, safe, and reliable source of energy. Our natural gas infrastructure is vital for a strong economy and the reliability of the state's power grid.

When it comes to affordability, natural gas is a proven reliable fuel source that can actually lower costs for families and businesses.

Additionally, Natural gas is improving air quality in our state. Natural gas produces nearly a third less carbon dioxide than coal and almost half less than oil when burned. Natural gas also emits little to no sulfur and runs more efficiently than other fuels.

Solar and wind. While there are no assurances that the State can rely on the availability of both solar and wind, the State needs to enhance our base-load capacity as a guaranteed backup, particularly in the event of another super storm.

The State Chamber supports solar development at sites such as landfills, brown fields, warehouses, and government facilities that provide potential for larger installations, improve economies of scale, and that would return unproductive or underutilized sites to societal use.

While we recognize that New Jersey has great offshore wind potential, we ask that the Board of Public Utilities (BPU) continue their due diligence process to safeguard the interests of ratepayers, making sure that we avoid any undue economic burdens. We would further suggest that the State engage our local and regional chambers of commerce, particularly the ones along New Jersey's coastal areas, when such projects are under consideration.

Energy efficiency. The State Chamber recognizes the importance of energy efficiency to achieving business and environmental goals. For businesses, using energy more efficiently saves, money, reduces operating costs, increases competitiveness, and promotes job retention

and creation.

The State Chamber would welcome development of additional efficiency programs aimed at commercial and industrial customers that could help deliver the benefits we mentioned.

We also encourage State and local government to lead by example and pursue efforts to reduce energy demand in government buildings.

Lastly, fuel cell technology. Fuel cells eliminate pollution -- the only byproduct is water. Because fuel cells have no moving parts and do not involve combustion, this technology has the potential to achieve great efficiency. The State Chamber encourages the State to work with and support the research of New Jersey's academic institutions to pursue making fuel cell technology another viable option to our energy demands.

The State Chamber appreciates the opportunity to provide input and respectfully requests that our views be given proper consideration.

MS. CYNTHIA HOLLAND: Thank you. Mr. Westhoven, and on deck I have Mr. Kim Ghee.

MR. STEPHEN WESTHOVEN: Good morning. My name is Steve Westhoven, I'm the President and Chief Operating Officer of New Jersey Resources and Principal Subsidiary of New Jersey Natural Gas.

I'd like to thank Director Cynthia Holland and the Board of Public Utilities, members of Governor Murphy's Energy Master Plan Committee for the opportunity to speak here today.

New Jersey Resources is a diversified energy provider with a strong long-term commitment to sustainable business practices. We are a major investor in New Jersey's solar energy market and a leading solar provider in the state. And for almost a decade our principal subsidiary, New Jersey Natural Gas has successfully deployed energy efficiency solutions to reduce energy demand and help our customers lower their energy costs, lower their emissions, and

protect the environment.

My primary purpose in testifying before today's committee is discuss our ability as a natural gas utility and a lifeline service provider to ensure that our customers have reliable heat when they need it most, on the coldest days of the year.

The state's natural gas utilities have a regulatory obligation to procure natural gas supply in the associated delivery capacity to provide safe and reliable service. The fact is natural gas utilities in New Jersey are facing increasing challenges during the winter season to meet these obligations for their current and growing number of customers who rely on natural gas to heat their homes and support their businesses.

Our primary challenge is the inability to require additional capacity for the existing interstate pipelines. Without additional capacity we simply cannot access enough supply to meet our growing customer needs and provide a safety

reserve, as responsible planning would dictate.

Our natural gas utility currently depends on two pipelines for nearly 90 percent of our supply capacity. Destruction of supply on either one of these pipelines in the winter heating season would jeopardize the health and safety of potentially hundreds of thousands of New Jersey's residents.

We have an obligation to ensure reliable heat in the winter, so it is with urgency that I am coming before you today to raise awareness about these time-sensitive statewide issues. I'm here to convey extraordinary importance to addressing this projected shortage, the reliability risks associated with the lack of pipeline diversity, and the need to propose solutions in New Jersey's next Energy Master Plan.

While we fully support and are actively participating in the efforts to achieve a clean energy future in the state, reliable service must be ensured to our

customers along the way.

According to the U.S. Energy Information Administration about 3/4 of households in New Jersey use natural gas as their primary home heating fuel. The benefits of natural gas are clear, it's affordable, up to four times less than the cost of electric heat. It's clean, it produces less than half of the greenhouse gas emissions from other fossil fuels, and it's reliable, a benefit that is increasingly at risk in New Jersey today.

There's been a growing demand for natural gas for decades, but the resources necessary to bring additional supply to New Jersey to meet this rising demand have not been met. While mandated and aggressive energy efficiency measures will help offset a portion of the anticipated demand, additional capacity will be essential to address the remaining natural gas supply and reliability gaps, particularly as we transition to more renewables in the clean energy economy.

Importantly, I want to be clear

and make the distinction if these projected natural gas shortages are not inclusive of New Jersey's power sector, which will only exacerbate the challenges we face during the transition to renewable energy.

Existing supply and resiliency concerns stem from the fact that the interstate pipeline companies serving New Jersey are fully subscribed, which means natural gas utilities can not purchase additional from capacity to meet demand. This is a regional problem impacting other states, including New York.

Without additional supply infrastructure our company and the other natural gas utilities in the state estimate there's a shortage -- estimate a shortage of natural gas to meet our coldest-day demand needs. Without greater diversification of our supply infrastructure the risks of a major disruptive outage affecting service to our customers continues to loom.

Our utilities are currently tapping into safety reserves to meet this

growing demand, which is not sustainable or consistent with the prudent planning process that the natural gas utilities undertake to ensure reliable service to our customers.

Based on forecasts in 2021 our company may not have access to sufficient supply service customers. We must urgently work together to find a supply solution to increase the capacity and resiliency.

The suggestion that New Jersey has enough natural gas capacity is incorrect. While it is the position of some advocates to prohibit all fossil fuel infrastructure investments, these policies could compromise safety and reliability and put our citizens at risks. They will also undermine the efforts to obtain the public support needed to meet our clean energy goals.

In April 2016 there was a pipeline incident that caused a natural gas supply disruption to New Jersey and other states in the northeast. The emergency repairs and inspections that were necessary to

restore this pipeline back to service took several months. Let me repeat that time frame. It took months, not weeks, to restore natural gas service.

New Jersey Natural Gas experienced a 64-percent reduction in pipeline deliveries on that day. If this had occurred on a cold day in the winter, over 250,000 house holds could have lost gas supply. Statewide, millions of people would have been impacted.

The solution to address this risk is to incorporate diverse natural gas supplies and interconnections to multiple sources as a priority to build natural gas system resilience. This supply diversity would help New Jersey to prepare for potential loss of supply from an interstate pipeline disruption while protecting customers from an outage.

Since Superstorm Sandy New Jersey has taken extraordinary efforts to strengthen our resiliency against catastrophic natural disaster such as flooding. We have raised homes and

businesses, and under leadership at the Board of Public Utilities we have aggressively hardened our in-state pipeline delivery systems against future storms. We need to do the same for interstate pipeline network.

We need to diversify supply access so if supply is disrupted on one pipeline system, there are alternatives to ensure that we can heat our customers' homes, hospitals, schools, and businesses. If prudent planning is not done by the natural gas utilities in the state, the public will and should question what went wrong. We will all be held accountable.

New Jersey Natural Gas is working closely with the BPU on these preparedness issues and we recommend again with urgency that they're reflected in the updated New Jersey Energy Master Plan. As the state defines the future role of natural gas and its resilience and sustainable infrastructure and its clean energy bills, the ability to access adequate supply to heat people's homes and meet our

obligations to essential service providers, such as hospitals, during the coldest days of the years must be a high priority. Our customers must be our highest priority. Natural gas will continue to be a key element in helping the state transition to a clean energy economy in 2050.

As New Jersey looks to a clean energy future, natural gas will also continue to play an essentially role in the power sector, balancing the intermittent output of renewables to maintain grid reliability as we add more solar, wind, and new technologies to the mix.

The low cost of natural gas keeps our customers' rates affordable while accelerating investments in renewables, such as solar and wind. Natural gas also provides measurable air quality benefits by displacing coal and other fossil fuels, such as oil, which have higher emissions.

In closing, as we transform our energy sector, we must not compromise on the needs of our customers who depend on us to provide affordable, reliable service.

The BPU stakeholder process to inform New Jersey's Energy Master Plan has provided us the opportunity to bring these important customer issues hopefully to the forefront of this planning process.

I appreciate the opportunity to participate in today's proceeding and share our view on New Jersey's energy future. Thank you.

MS. CYNTHIA HOLLAND: Thank you.

Mr. Ghee, and on deck we have Nanette Lockwood.

MR. KIM GHEE: Thank you, Ms. Holland. We submitted written comments, and hopefully to reserve some time for other speakers, we'll reserve that time. Thank you.

MS. CYNTHIA HOLLAND: Thank you.

Ms. Lockwood? And then I have on deck Mr. Paul Heitmann from Business Innovation.

MR. EVAN BERGER: Thank you so much. As you can guess, my name is not Nanette Lockwood. Rather, I'm Evan Berger. I work with Ingersoll Rand, and I also work

with CALMAC. And I was here, I spoke on Monday. I'm really thrilled to be back and talk before this panel as well because it's really exciting to see what all you folks are doing here in New Jersey as regards, not only the Energy Master Plan, but also the governor's very ambitious and also, we believe, 100 percent achievable goals, not only in 100 percent real energy, but very aggressive energy storage mandates that you guys have put together with the state legislature.

So a little bit of background about us at CALMAC. So we were purchased last year by Ingersoll Rand, by the Trane company. So Ingersoll Rand is a large diversified multinational conglomerate in the industrial space.

And CALMAC has always been a New Jersey-owned-and-operated business. We were founded in 1947 in Englewood. We have been operating out of Fairlawn, New Jersey, been manufacturing there. We've created what we think -- we work in a thermal energy storage space, so ice storage, and

we have manufactured over one gigawatt of ice storage here in New Jersey that has been deployed across 60 countries, 4,000 projects globally worldwide.

Some of our marquee projects include Rockefeller Center, we just did a second project there, about 2 megawatts in total. Just finished a project up at LaGuardia Airport. The University of Arizona has 30-megawatts hours of our equipment. So a lot of stuff made here and, you know, in place across the entire country and globe.

So in terms of the subject at hand I wanted to talk a little bit about thermal storage and how that plays into resiliency and a stronger and more sustainable grid.

So what we do in the thermal energy storage space is not that different from battery storage, and battery storage is getting a lot of very well deserved press, and we hope that we also can play a part in this thing as it grows. Jaydice (ph) is laughing, and that's actually what -- Tesla is getting a lot of great

appreciation, and I believe well deserved, and we've been here a long time.

So as far as batteries are concerned, what they really can do that we can't is they can provide power for lights and computers and other plug loads, whereas we really operate solely 100 percent for cooling. However, cooling is 40 percent of the grid's peak load during the hottest weekday hours when the grid itself, both here in New Jersey, and the PJM connection peaks out as a whole.

So when you're designing your power grid to the highest intervals of true consumption, you are really basing it off of HVAC, off of air-conditioning load, and that's what we really hone in on and reduce.

And in addition to being able to do that we're a whole lot less expensive than electric batteries because whereas they are storing energy in the form of lithium or lead with the -- you know, with lithium as their means of storage, we're using plain old regular tap water, which is

a whole lot cheaper. So we are able to store the same amount of kilowatts for a longer duration, our typical duration is about eight to ten hours, at about a third of the price. And our tanks last about 40 years on average.

So for the tank construction we have an aluminum jack on the outside. Most of the tanks is high-density polyethylene, which is the same material used in a natural gas pipeline. Those are rated for a 50-year life, and we've been able to have projects in -- from the early '70s, I should say, that have been in complete and full operation day in, day out since then without having to be replaced.

So in terms of what -- how the tanks work and providing resiliency and sustainability for the grid the number one benefit of energy storage across all sectors, all types, no matter how it is that you're storing the dispatch from the energy, the number one value to the grid is being able to integrate intermittent renewable resources. The sun signs when it

does, the wind blows when it does, but when you don't have that, you don't have a firm power source.

So if we want to get to those by 100 percent 2050 goals that the governor has so adamantly outlined, there's no possible way to do it without a tremendous amount of energy storage on the grid. And not all of that can be the very expensive, very materials-intensive lithium and lead batteries that we currently see.

So I think thermal storage, and many states have already taken this into consideration, I'm sure New Jersey will as well, recognize that this is not going to be just one solution, but a whole suite of solutions including thermal and some others.

In addition to the benefits from simply integrating that renewable energy, another big thing that we do is we reduce those peak loads not just for individual facilities -- for the Rutgers University campuses, we've got some storage there, or Perth Amboy school district. So we're

helping to reduce their peak loads during those hot summer afternoon hours when the grid peaks up. But that also had has a grid-wide affect as well.

So one of the reasons why we're so popular with Con Edison utility in New York City is that we are reducing their peak load by 20 or more megawatts during the highest peak hours of their grid as a whole.

And so when it comes to incentivizing or accelerating market adoption, we've gone good business here in New Jersey, but it hasn't been the kind of business that we have done in places like Florida, Texas, to a lesser extent California, and to a greater extent New York City. And the reason why is that the incentive structure, the support from government, unfortunately, has not been here in the recent past. Very -- I would say modest incentives, modest rebates or programs have been extremely beneficial in terms of making us cost neutral with typical, regular cooling. And in the case

of New York and Florida, have driven us to make many megawatts of load reduction in the pockets where they're most valued.

So when it comes to designing a program and designing a way to accelerate and incentivize these programs, or these technologies like ours, what I would suggest to you folks in the committee is you want to have them easily understandable by the public because most of the projects that we do are with hospitals, universities, schools, customers that freely admit that they're not the most energy savvy out there. That's not their mission, that's not what they're trying to achieve. They serve their customers and folks who come, you know, and stay in their beds and sit in their classrooms. They're not energy monitors.

So it's important to have rebates or incentives that they can calculate themselves, just, you know, pull out their iPhone or their calculator and figure it out. That's so important.

The second thing is to design it

most effectively. Incentives do really need to be front-loaded because individuals and companies put a very high discount rate on -- you know, on any out-year benefits. So we found that if incentives are given out over a ten- or 12-year period, people don't really consider two -- you know, in year two, year three, year five and beyond, they don't consider those at all. They discount them by 10, 20, 30 percent, they discount them down to zero.

And the last thing is that I would really recommend -- we like non-wires alternatives programs. Those are very good, particularly when you have a real acute need. But the problem with those is they're sporadically available.

What I would recommend is having either a schedule for when incentives are available or just have them available on an ongoing bases so that your institutions, your schools, your hospitals don't have to be chasing RFPs, they don't have to wait for incentives. They can make the capital decisions on their own bonding situations

or their own time lines without having to, you know, work through that. Because when you have these sporadically available RFPs, what ends up happening is only the wealthiest and most capable companies with the most sophisticated teams can go after them, and our everyday customer miss out on them.

So we're going to be delivering more comprehensive testimony or some comments to you. But thank you very much for your time and I really appreciate the opportunity to participate in some small-deed democracy. So thank you very much. Take care.

MS. CYNTHIA HOLLAND: Thank you. Our next speaker is Paul Heitmann from Business Innovation, and then on deck I have Michael Renna from South Jersey Industries.

MR. PAUL HEITMANN: Okay. Thank you. It's Businovation.

MS. CYNTHIA HOLLAND: Oh, sorry.

MR. PAUL HEITMANN: No, you pronounced it the way it's spelled.

MS. CYNTHIA HOLLAND: Oh, okay.

MR. PAUL HEITMANN: But Businovation, which is my company, consulting company, and I've been doing this for a while. I was on the original Energy Master Plan sessions where I optimistically suggested electric transportation should be part of it ten years ago.

Just a little bit of kind of my background. Businovation has served with IEEE to develop standards in several of these areas, notably the interconnection standard for allowing the utilities to connect to this distributed energy, IEEE 1547.

And I also chaired the trans-active energy work group for IEEE, which is a development standard. I also am currently working on the town center DER program for Middletown, one of 13 microgrid awards for feasibility study. We're working with Leidos on that.

And I participated in SEPA, Smart Electric Power Alliance, on their microgrid

and trans-active energy work groups. So I think you see where my comments are going. Going to talk a little bit about trans-active energy and how they can work together. It's a different model of doing this.

So I'd like to start more at a philosophical level, and I will submit written comments with links to relative data and backup for all of this.

So philosophically four points I want to make is resilience and community self-sufficiency go hand in hand. That's a principal we forget a lot of times, that communities want to be self-sufficient, they want to do things to make sure they're resilient and recover from storms. They don't want to just be relying on other people helping after a disaster. Middletown's a perfect example of that. We're very proactive in getting ready for Sandy, too, with their microgrid.

But to do that you've really got to empower communities, their aggregators, and the prosumer even, to make the

investment in this distributed energy that will work and interact with the grid and not just be shunned for marginally used, such as solar is now in many cases.

Ultimately everybody want to get away from government subsidies. Not everybody, but most people, want to move to a market-driven system that pulls in the assets that can help. So distributed energy, self-sufficiency in communities is important.

Second point, altered efficiency is the new energy world order right now. We see altered efficiency in transportation with Uber and Lyft, altered efficiency with Airbnb in the housing area and other industries. They're all moving to altered efficiency.

They're adopting things like a block chain to strip out all intermediate processes that cause a lot of friction and waste, and it really is all about altered efficiency, and it starts with unlocking energy data that's available for innovators to use and promote solutions. So one of

the blocks that we'll talk about later is the ability to get energy data from the utilities.

There's an initiative underway in Washington, D.C., their counsel called DERA, the DER Authority, looking at actually establishing an agency to be a steward for that data. So it's not so hard to get when people want to use it to integrate. It's all part of making things ultra efficient in both energy production, local clean energy production, and responsive power distribution operation. So the utilities can really improve their distribution system to match where this needs to go.

Energy justice. I propose everybody's familiar with that term in terms of supporting low-income subsidies, the provider of last-resort obligations but I would suggest it extends to really be mandating a fair and more transparent risk-reward sharing. Right now nobody really can see into the process. Rate cases give you a partial glimpse, but for

the most part people don't understand how they can participate, nor are they encouraged. But if you move to a more transparent system where risk and reward is shared, it's not just risk is offset and reward is, you know, accumulated, which largely what the current system does. Then we move to that more efficient system on a level playing field.

And then, lastly, the fourth main part is smart cities. There's a lot of communication that's needed and lacking between silos. The perfect example is electric transportation, which is a phenomenal asset in the grid side. And I think this Energy Master Plan is finally realizing that synergy, and I see it's a major thread, and I hope we can really accelerate that and unlock the value of electric transportation. That's part of this distributed energy system.

So the last two -- or the two specific areas, as I mentioned among microgrid and the trans-active energy community, and we're doing this microgrid

study in Middletown. So first of all, microgrids are fast emerging as a viable decentralized alternative or augmentation to traditional central source, power source, and controlled electric power delivery.

And the reason is because the costs for small renewable generation -- I think previous testimony talked about the cost for these batteries and distributed energy is dramatically dropping and still dropping. So all of a sudden you've got the availability and the ability for people to buy this. Let's make it work in a very synergistic way because they're to buy it anyway, it's going to be there to deal with.

Computing and communication power are continuing to advance. And along with all of that together, rapid movement in artificial intelligence. These are the trends that IEEE are seeing, and they're coming faster than you can imagine. So let's set it up and harness that and reinforce the efficiency gains that we've

mandated.

It really is all about efficiencies and along with fairness and justice and resilience. And communities are recognizing that true resilience and fiduciary responsibility demands a stronger local stake and participation in the process.

So that is the opportunity that we have. And I really applaud the community solar program as an opportunity to say, hey, as a community we can do something different. The barriers are lower, let's see if it makes sense and the economics work.

Lastly, the utilities themselves recognize the value of distributed energy. Other states where utilities can own and operate some generation, down south, Duke Energy, for example, in their ten-year integrated resource plan they have microgrids. So it's almost -- there is the implied efficiency right there in an area that it's allowed to happen.

So I strongly support microgrids.

The barriers that are in place for microgrids are pretty much all wrapped around existing utility franchise protection, and that causes a lot of what I call preemptive frictions. I think many people have experienced those in different ways, but we'll just wrap it up under preemptive.

So limited data access is one, and a force to aggressive capex proposals to further the business model. So those two things, a perfect example of what DERA, this DER Authority, is all about. Their major mission is to be a steward of the data, for energy data, and unlocking that, and also giving an opportunity for, in that case, anything over $25 million to automatically route through for consideration of a non-wires alternative. So I would propose look at this DER legislation, I know a lot of people have seen that already, as a way to accelerate that.

And, lastly, on trans-active energy this is an area that fundamentally

changes the way the grid is operated and energy is consumed into more of a partnership or participation at the edge. So think in terms of somebody goes out and invests in an asset, puts it locally to their town or their premise and they've got the opportunity to put that asset as a service into the grid and get paid for it, and it's a valuable service. And a lot of these are being advanced at the DOE level and SEPA themselves is moving that.

Block chain is a real foundational part of this that is enabling this, as I said, stripping out a lot of the inefficiencies, and then also ensuring he security and integrity of the data. And then the other technologies that are coming, let's explore, at least, opportunity for trans-active energy in a regulatory sandbox, or two or five, and get some data and see how it works.

So that's my suggestion. And I appreciate the time for listening, and I definitely will follow this up with written comments, and if anybody wants to talk over

coffee about some of those topics, come and get me and we will. Thank you.

MS. CYNTHIA HOLLAND: Thank you.

Mr. Renna, and on deck we have Derek Phelps from FuelCell Energy.

MR. MICHAEL RENNA: Good morning. My name is Mike Renna. I am the president and chief executive officers for South Jersey Industries. Our principal subsidiaries, South Jersey Gas and Elizabethtown Gas, serve nearly 675,000 customers in New Jersey.

SJI is committed to helping the state achieve its 2050 energy goals, and we believe only a bold and comprehensive plan, one committed to driving down and keeping down energy costs, to promoting a diverse portfolio of energy sources, with an emphasis on renewables, energy efficiency, and conservation, one that leverages emerging technologies and transportation and production, all while protecting and modernizing our critical infrastructure, will allow New Jersey to reach its 2050 goal.

Safety remains SJI's top priority. Maintaining a sustainable, resilient gas infrastructure system is a responsibility I do not take lightly. The impacts from Superstorm Sandy almost seven years ago are not and should not be forgotten. Sadly, along with recent storm events highlight the critical importance of maintaining and upgrading pipeline infrastructure.

SJI has worked diligently with the New Jersey Board of Public Utilities to strengthen, improve, and modernize our natural gas infrastructure. At South Jersey Gas our storm hardening and replacement program brought high-pressure mains to our barrier islands, making our system far more resilient to the effects of coastal weather events.

Under our cornerstone accelerated infrastructure program South Jersey Gas has replaced nearly 850 miles of aging infrastructure and is on track to replace all of our remaining bear steal and cast iron in our distribution systems by 2021. At Elizabethtown Gas we are equally

committed to modernizing our infrastructure and protecting the safety and reliability of our system.

Since 2009 ETG has replaced 425 miles of aging infrastructure, but with a remaining inventory of roughly 600 miles reinforcing the remainder of ETG's natural gas infrastructure is our top priority.

We also strongly support expanding the critical infrastructure that supplies New Jersey with a clean and cost-effective natural gas. Access to abundant and inexpensive supplies is critically important to the affordability and competitiveness of our state and to building out the wind and solar infrastructure essential to achieving Governor Murphy's 2050 goal without putting an untenable financial burden on New Jersey's residents.

Over the past decade there has been rapid and sustained growth in the protection of natural gas, much within close proximity to New Jersey. Delivery restraints, however, have prevented New

Jersey ratepayers to take full advantage of this abundant resource. Investment in additional infrastructure will afford New Jersey homes and businesses with access to some of the cheapest natural gas in the world. In fact, recent studies indicate New Jersey could have saved roughly $300 million during the two-week period of extreme cold we experienced this past January had this infrastructure been in place.

Increased access to affordable or nearby gas will also ensure that New Jersey ratepayers continue to benefit from the head room it creates for investment in critical infrastructure modernization programs like the one I've discussed earlier.

Carbon-free electricity by 2050 is a goal we all support. Clean and affordable natural gas delivered through a modern and expanded infrastructure can and will provide the economic bridge as we work toward fully dependable and resilient solar, wind, and storage technologies.

SJI remains committed to partnering with the committee and the state to help deliver on the promise of the governor's 2050 plan. Again, thank you for the opportunity to provide comments and for allowing SJI to be a part of New Jersey's energy future.

MS. CYNTHIA HOLLAND: Thank you. Mr. Phelps, and on deck we have Ryan Grech from Pinelands Preservation Alliance.

MR. DEREK PHELPS: Good morning. My name is Derek Phelps. I'm with FuelCell Energy, I'm director of market and project development at FuelCell Energy. Our company is in our 50th year of operation headquartered in Danbury Connecticut with our manufacturing facility located in Torrington Connecticut.

We've previously provided testimony and comments at the first stakeholder meeting related to the inclusion of fuel cells as a clean energy resource and earlier to the Board of Public Utilities concerning our products, value proposition, and contributions to grid

resiliency and the reduction of greenhouse gases. I will not repeat those comments here, but instead offer a brief synopsis of more fulsome testimony that we will file in writing prior to the October 12th deadline.

With respect to the topic of today's session, sustainable and resilient infrastructure, FCE respectfully suggests that fuel cells offer unique benefits that contribute to resiliency and infrastructure that are not achievable via more traditional intermittent clean energy resources. We believe that the most secure power is distributed generation, more generated -- power generated near where it is consumed that does not need to be transmitted over long distances.

With respect to the benefits of resiliency, fuel cells have a proven record of providing reliable, consistent energy for sites in need of high-quality primary power such as data centers, hospitals, university campuses, military bases, and other critical users often displacing older, inefficient diesel backup

generators. With their islanding capability fuel cells are on the back bone of microgrids and their installations have seamlessly transitioned to microgrid mode when the grid has gone dark.

We have such microgrids operating in many places. One example is the municipality in Woodbridge Connecticut, where the fuel cell feeds the grid during normal operation, but during the grid outage we'll deliver power via underground feeders to police, fire, town hall, the high school, and other critical municipal facilities irrespective of weather conditions.

We have many fuel cells at universities, including one at the University of Bridgeport, which serves as an emergency evacuation shelter for New York City due to its fuel cell based microgrid.

FCE is currently constructing a 7.4 megawatt fuel cell project at a U.S. Navy submarine base, which will ensure the delivery of reliable, around-the-clock

power at critical services, helping the Navy to adapt to the dynamic energy security challenges of the 21st century and making it less likely to be the subject of a future BRAC determination, BRAC being base rate alignment and closure, an important criteria related to a BRAC review that occurred with the submarine base just a few years ago. And we're effectively correcting that for them.

FCE is currently constructing a seven -- excuse me, fuel cells also contribute to local infrastructure development as fuel cell projects support the expansion of infrastructure to underserved areas, bringing in gas lines that can then displace resources that create more criteria pollutants and greenhouse gas emissions such as home heating oil and backup diesel generators.

Fuel cells can also obviate the need for more expensive infrastructure investments. One example is the recent award of an approximately 40 megawatt award of fuel cell projects on Long Island Sound.

LIPA was faced with a need for clean energy in a heavily constrained area with little available real estate by strategically selecting three fuel cell projects totalling 40 megawatts to connect the targeted substations LIPA was able to avoid $78 million in transmission upgrades that would have otherwise been required to bring the necessary power to the local area. These projects were awarded via a feed-in tariff with a power purchase agreement, thus resulting in zero capital outlay by the utility.

Although compact quite, unobtrusive, and easy to sight, our installed fuel cell are robust industrial power plants with an average reliability rate in excess of 95 percent. That provides steady, reliable power through hurricanes, earthquakes, blizzards and the California wildfires. Few clean energy resources can claim such robustness of reliability.

With respect to siting concerns FCE respectfully suggests that New Jersey

study Connecticut's siting model, which places exclusive jurisdiction for siting of all energy and telecommunications infrastructure in one statewide agency, known as the Connecticut Siting Council, whose members are appointed by a diverse range of stakeholders.

This single agency is then able to balance infrastructure needs and environmental justice concerns while avoiding typical NV and -- here's another acronym for you, BANAA, build absolutely nothing anywhere anytime.

Outcomes. I used to run the siting council. Full disclosure, I ran it for about ten years, and I'm a huge defender of that model and I saw how it works very effectively and very challenging siting scenarios

Finally, FCE respectfully suggests that it is most cost effective for ratepayers to turn the benefits of new infrastructure in the pursuit of these important policy goals when such projects deliver the multifaceted value proposition

of fuel cells, improved resiliency, reliability, cleaner air, tax revenue, often significant tax revenue, and ease of siting, all in a cost effective manner.

With respect to the integrity of the grid we also wish to underscore that given their distributed status, around-the-clock security monitoring, compact design nature, and the absence of internal combustion activity, fuel cells are inherently more secure than most any other mode of power generation available, particularly relevant to the amount of power generated per area of development.

Thank you for your time and for your consideration. FuelCell comments -- we look forward to contributing to New Jersey's pathway to clean energy and being a part of New Jersey's Clean Energy Master Plan. Thank you.

MS. CYNTHIA HOLLAND: Thank you. We have Mr. Grech from Pinelands Preservation Alliance and Barbara Blumenthal from New Jersey Conservation Foundation.

MS. RYAN GRECH: Good morning. My name Ryan Grech, that's G-R-E-C-H. I'm with Pinelands Preservation Alliance. Thank you for the opportunity to speak today. PBA is a non-profit dedicated to preserving the resources of the New Jersey pinelands.

The new Energy Master Plan should be used to discourage new fossil fuel infrastructure, especially when such new infrastructure is proposed to be built along new paths and in disregard of regional and local environmental protections such as those embodied in the Pinelands Comprehensive Management Plan.

In the pinelands we have been fighting two wholly unnecessary natural gas pipelines, one proposed by South Jersey Gas and one by New Jersey Natural Gas. In each case the rationale given has shifted over the years in controversy, but remains unpersuasive. In each case the utility insisted on routes that cross protected areas of the pinelands. In each case the pinelands commission, under intense

political pressure, twisted regulations that were clearly intended to prevent this type of infrastructure from crossing these protected areas to get from one side of the pinelands to the other. And in each case the utilities and the Board of Public Utilities used the old Energy Master Plan as a crutch for improving the development.

While the intervening years show there is no need for these developments BPU's standard for approving and making ratepayers pay for these pipelines are so lax and undemanding and the economic incentives given to the utilities so antiquated, that the companies are still pursuing these projects.

The most pernicious rationale we hear over and over again is the need for reliability and resiliency. We have seen that these concepts are endlessly abused and applied by government and industry without regard to any rigorous technical analysis and testing in the approval process. Superstorm Sandy is invoked to justify pipelines that such storms do not

and could not affect. Real discussion takes place in secret and is never subjected to independent scrutiny.

No genuine considerations of alternative approaches is considered because the decision to build is made first and the analysis shaped after the fact. The human health and safety risks of these developments are consistently disregarded by BPU and other agencies despite the evidence in the news.

In the case of the two pinelands pipelines experts with no financial interest in the outcome have demonstrated that there is no actual need for more capacity in these locations, and that even if you want to believed there was, there are alternatives that are cheaper, more effective, less dangerous to the public, and outside the pinelands conservation zones. And the hundreds of millions of dollars that the utilities want ratepayers to invest in unneeded natural gas pipelines will inevitably discourage investment in the renewable energy infrastructure we

need.

We look to the new Energy Master Plan to set a new course and to make clear that the easy habits and assumptions of the past, habits and assumptions that haven't made sense for many years now, are truly being replaced with the commitment to reduce, not to expand, our dependence on fossil fuel systems in favor of new renewable energy systems. Again, thank you for the opportunity.

MS. CYNTHIA HOLLAND: Thank you, Ms. Grech.

Barbara Blumenthal, New Jersey Conservation Foundation, and on deck I have Joe Accardo, PSE&G.

MS. BARBARA BLUMENTHAL: Good morning. My name is Barbara Blumenthal. I serve as the research director for the New Jersey Conservation Foundation.

I'd like to talk about some common misconceptions about natural gas and the role of natural gas currently and in our future. The first one is that we need more pipeline capacity, and I want to address

some comments that were made by our colleague from New Jersey Natural Gas earlier today.

With the kind of facts and analysis that we've been using over the last three years as we have looked carefully at a number of pipeline projects in this state, we issued a report this week that summarizes three years worth of research in one handy place. So I want to refer to some of the data that underlies this perspective.

So I want you to understand how we did the research. We used international gas consultants, the best ones in the country that we could find that have been doing this work for 30 years, who work for the industry. They're not -- they don't work for environmental groups normally. This is something new for them. They analyze pipeline capacity for people who are buying and selling pipelines.

And so the kind of data sources they look at, they have data on every contract on every pipeline that exists.

They have data on scheduled deliveries every day. So you schedule a day ahead, and then you can revise your schedules, but they have all those transactions, every scheduled delivery on every pipeline. And then they actually have data on actual deliveries.

And looking at these data sets really tells an interesting story. Three years ago we were surprised when we looked at New Jersey Natural Gas and the contracts that they have. Of course, the most interesting period to look at pipeline capacity is in the winter because that's the only time they're full, where our pipelines in New Jersey have a 46 percent load factor, which means on average they're about half utilized throughout the year. It matters in the winter. That's when they are at their highest utilization rate.

So back in January of 2015 New Jersey Natural Gas has most of its firm contracts on Texas Eastern. It's a major pipeline. But in the middle of the polar vortex, when somebody would need gas the

most, they actually sold off 87.8 percent of all of their capacity in the market. That says something about whether there is excess capacity on a system, when you are trying to deliver in a record cold spell natural gas to residences and commercial buildings, that you are somehow able to forego 87.8 percent of your contracted capacity.

Another way of looking at this is regulated utilities are required to tell regulators what their needs are and whether they have enough capacity. Rate Counsel has weighed in very strongly on some of these same questions using a different gas consultant, who is also nationally recognized. And they made it clear that these same regulated utilities who will tell us a story about needing more pipelines and reliability at the same time have told their regulators that they don't.

I'll give you another piece of information that we were surprised about. From 2011 until 2018 New Jersey has about five billion cubic feet of pipeline

capacity available to it for customers in New Jersey. That's the capacity that people would be able to contract for if they wanted it. There's about five billion. Three billion was added. There was new development between 2011 and 2018 adding 3 cubic feet of new capacity to the system.

There has been a massive build-out of pipeline capacity coming from the Marcellus Shale region to various locations around the eastern seaboard and to the south. And that is part of the story of why sort of in the middle of this somebody decided that they wanted to build Penn East, a proposed Penn East pipeline, but it turns out that by now we have more capacity than we need.

We've looked at -- one way of answering that question again is to look at this past winter. We called it the bomb cyclone, so yet another massive cold spell. This one was even more severe than the polar vortex, it lasted longer.

And during this period we looked

at very carefully at the Transco pipeline -- it's actually the biggest pipeline artery going through the middle of New Jersey -- to see what happened on those cold winter days, what happened on the Transco pipeline.

There's five -- in this zone that we looked at, so it's not the same number as New Jersey only, but there is a zone 5 and six that we're part of, there's five billion cubic feet contracted on Transco. And when we looked at deliveries, they delivered 5.3 billion cubic feet. So how do you do that? They contracted the maximum physical capacity available, and yet they delivered 5.3.

So what happened is Transco became bidirectional in the last couple of years, and this analysis shows that they can now deliver 7 billion cubic feet of capacity because it's become bidirectional. And there was 1.7 billion cubic feet unutilized even during those -- on the coldest days in that prolonged cold spell. 1.7 billion cubic feet was not utilized. Was available

for customers in New Jersey, not utilized.

The Atlantic Sunrise pipeline was completed since then, adding another 1.3 billion, so that adds up to exactly 3 billion of excess capacity now, today, just on one pipeline, Transco.

So if you wanted to see more details, we have data -- we'd like to talk about data. We'd like to share these very wonky graphs, low-duration curves, all the data and we'd be happy to share it with anybody.

Then we get on to a somewhat different topic, is what does this have to do with the Energy Master Plan and our clean energy agenda, so that's a few misconceptions around that as well.

One misconception is that gas-fired generation is the only way to manage variable resources. As we get to 30 or 50 or 70 percent renewable energy, we must need more gas in order to manage that. Well, it turns out there's no new modeling being done in California, Hawaii, Minnesota, and other states, very

sophisticated modeling of the electric grid, to ask the question about reliability. How can you manage high levels of variable resources and maintain electric grid reliability.

And what they show is you can get to 90 percent or even 100 percent emissions free. It means very little natural gas or no natural gas and maintain a reliable electric grid. So this is -- it's a misconception.

There's new evidence in modeling that supports a different way of looking at how are we going to achieve this. And you achieve it largely through flexible load, transmission, and storage. Those are the ingredients, and they begin to replace natural gas as the balancing force in the electric grid.

Another misconception is that somehow natural gas has to be part of a low-cost future, and that's really the exciting thing about these modeling results, is it shows that the low cost future is a package of renewable resources,

which sometimes are more expensive. We just looked at a natural gas plan today and a renewable. You might notice that renewables can, depending on where you are, are sometimes more expensive, but the package of renewable resources, flexible load, storage, transmission, is a lower cost pathway to 2050 than one that's based heavily on natural gas

So I'll stop there. And if you want to see our report, it's available online. Thank you.

MS. CYNTHIA HOLLAND: Thank you. We are still accepting comments through October 12th.

I have Joe Accardo from PSE&G and Charles Fox on deck from bloom energy.

MS. DANIELLE LOPEZ: Good morning, everyone. My name is Danielle Lopez. I'm assistant general regulatory counsel for PSE&G. I'm going to be pitch hitting for Joe Accardo today.

Good morning to the BPU staff and all the other staff that's here and present on this panel. We thank you for the

opportunity to provide initial thoughts. We thank you for the opportunity to speak here regarding sustainable and resilient infrastructure.

PSE&G has a long history of partnership with the state, aligning its interests with those of New Jersey. Significantly, and with respect to sustainable and resilient infrastructure, this partnership has been critical.

As prior EMPs have found, the generation and delivery of reliable and safe energy is a key element of a healthy economy. When the utility industry's substantial financial contributions to the state's economy are coupled with the company's critical mission of managing and maintaining utilities' infrastructure, it becomes readily apparent why stable -- and why utility companies are critical for the existence of all businesses and residents in New Jersey.

PSE&G looks forward to continuing and building upon the work of prior EMPs that had ensured that New Jersey remains

properly focused on infrastructure investment to ensure energy resiliency, emergency preparedness, and response both today and tomorrow.

Infrastructure investments that enhance the reliability and resiliency of the electric and gas systems have benefitted all customers and create jobs. In our service territory alone we are seeing the value and importance of infrastructure resiliency in promoting tremendous urban renewal from Camden to Newark to Jersey City, just to name a few.

PSE&G supports the state's goals of making energy accessible, reliable, and affordable, maintaining a balanced portfolio of clean generation resources delivering the economic and environmental benefits of energy efficiency in supporting new energy technologies and renewable energy investments.

The back bone to all of those goals and objectives is a sustainable and resilient infrastructure. PSE&G is already emersed in the task of addressing the need

for more resiliency in the electric and gas network, those Energy Strong and modernization programs as well as its transmission replacement program.

In many areas of our service territory our assets have successfully withstood the test of time and lasted nearly a century. However, resiliency has become a more significant issue over time. We must now navigate dramatic weather shifts from temperatures of 50 to 60 degrees to near zero temperatures in less than a day, bomb cyclones, ice storms, heightened national security concerns, and a greater customer appreciation and desire for enabling and relying on renewable energy.

All of these imperatives require that resiliency of utility systems is a top priority when crafting long-range planning as well as EMPs. According to the U.S. Department of Energy between 2003 and 2012 weather events caused nearly 680 power outages, each affecting at least 50,000 customers. With more than 154 million

electric utility customers in the United States severe weather events are a concern for every utility company that services them.

To illustrate the scope of the problem on the ground here in New Jersey, Superstorm Sandy downed 9,441 utility poles, left more than 100 transmission lines out of service and damaged or flooded more than 4,000 transformers statewide leaving 2.8 million electric customers without power after the peak of the storm.

The lessons learned include that in today's digital age customers demand reliable power. Ultimately our goal has to be ensuring the lights work and that there is heat in the winter, air-conditioning in the summer, and that the proper flow of water and sewer systems are maintained. Meeting these goals not only benefits all citizens of New Jersey, but it has provided thousands of jobs to bolster the state's economy.

On the natural gas side the first phase of PSE&G's Energy Strong program has

hardened five meter and regulating stations and two peak shaving plants against storm surge, and flooding and 240 miles of gas mains, and over 21,000 services against water infiltration.

The second phase of Energy Strong, in addition to continuing to harden our metering and regulation stations, proposes projects that will improve the resiliency of the gas distribution system against the flag curtailments by interstate pipelines. These resiliency improvements are designed to reduce the potential interruption of service to PSE&G's firm customers, particularly in the winter season -- winter heat season when a loss of gas supply would be most detrimental.

PSE&G is also pursuing efforts to proactively modernize its gas systems to promote a safe, clean and reliable natural gas system well into the future. Cast iron and unprotected gas steel pipes represent less than 25 percent of PSE&G's infrastructure, but they account for more than 65 percent of the distribution systems

methane gas leaks each year.

The company's Gas System Modernization Program, also known as GSMP, addresses the issue head on. During the course of the first phase of the GSMP the company is making improvements to older infrastructure that served to reduce greenhouse gas emissions by the equivalent of 23,500 tons of CO2 a year.

As PSE&G moves into the second phase of this program, our objective remains to provide customers and the communities we serve with continuing environmental benefits to the magnitude of 31,000 cubic tons per year reduction in gas house -- greenhouse gas emissions.

On the electric side when the first phase of PSE&G's Energy Strong program is completed later this year, 490,000 of PSE&G's 2 million customers who lost power during Superstorm Sandy won't lose power again due to flooding.

By way of example, the program built in a new elevated station that did not flood during severe weather events of

May 27, 2018, while the old neighboring station flooded at its lower elevation.

In addition to continuing its efforts to raise critical electrical equipment in flood-prone areas, by phase II of the Energy Strong program the company proposes modernizing aging electric stations, installing stronger poles and wires to reduce wind and tree damage, install circuit reclosures and redundancies and employ advanced technology to quicken restoration.

Our experience demonstrates that it is possible to power the economy, provide good jobs for people, deliver reliable and resilient energy, and protect the environment at the same time, yet we recognize there is much to do. Our customers depend on our energy more than ever at a time of unprecedented and intensifying changes in technology and climate. And we understand and appreciate that the status quo is not an option.

We also understand that while we continue to work on improving and

modernizing our delivery system, we must also be mindful of the need to improve and harden the transmission system.

In fact, just last month U.S. Energy Department's National Renewable Energy Laboratory presented a new steam study finding considerable economic and engineering value in fortifying these connections to better distribute power resources around the country. The study highlighted the relationship between transmission resiliency and meeting renewable energy goals.

PSE&G looks forward to continue discussing these issues in the electric transmission and distribution systems as they become critical to enabling New Jersey's renewable goals.

Finally, and somewhat related, we understand that microgrid investments energy storage in certain applications played a complimentary role in protecting critical facilities. That said, investments that make existing electric and gas transmission and distribution systems

more resilient have and should remain the priority as they benefit the greatest number of residents in the most cost effective manner. Thank you for your time.

MS. CYNTHIA HOLLAND: Thank you. Mr. Fox from Bloom Energy, and then after your remarks we'll take a short five-minute break.

MR. CHARLIE FOX: Good morning. My name is Charlie Fox. I'm the director of regulatory affairs and business development for Bloom Energy on the east coast.

I want to first thank you for the opportunity to speak today. I think this is a great forum and sometimes difficult to get messaging across, so we do appreciate the opportunity. I'll keep my comments relatively brief today, and we'll be submitting much more detailed comments by the 12th.

The first point I'd like to make is that the topic of this hearing, sustainable and resilient infrastructure, is fundamentally different than any other

topic as part of the master plan process. And it has to do with the fact that New Jersey really can't afford to wait until 2030 or 2050 to focus on resiliency and customer resiliency in particular.

New Jersey residents have never -- and businesses have never been more reliant on an uninterrupted supply of electricity than they are now, and that reliance is growing every day. Every aspect of our life, every aspect of our personal and public safety is depending on reliable supply of electricity.

At the same time weather-related outages in the United States are up 80 percent over the last 15 years and 90 percent of the electric outages in the United States are a function of failures in the distribution system. I'd like to describe some of the things Bloom Energy is doing about that with its customers in other states, in states other than New Jersey, very briefly.

We build -- microgrids are a main focus of what the company does. We built a

microgrid in Hartford, Connecticut recently, known as the Parkville neighborhood. It covers an elementary school, gas station, senior center, and isolates that neighborhood from outage of the electric grid and has ridden through multiple outages over the last three years since it was installed.

We recently installed a microgrid for a very large technology company based in Cupertino, California. It's an extremely large building, larger than the Pentagon, and it's designed to operate indefinitely if the electric grid goes down. It's powered by Bloom fuel cells, a combination of Bloom fuel cells, solar, and storage. They operate together by base-load power and then the solar and storage are able to ramp up and down to compensate for when the sun is shining and when the sun isn't shining and the variations in the customer's load.

Recently we did a similar project with Con Edison in Brooklyn, a very interesting scenario there. You may have

heard of the Brooklyn Queens Demand Management Initiative. What happened is that the load in Brooklyn was growing so rapidly Con Edison couldn't keep up. It needed to keep the lights on in Brooklyn this past summer and proposed a bill that -- a very large transmission line and substation that would have ratepayers cost $1.2 billion.

Instead, they worked with the State of New York and put together a program that targeted reliable distributed energy resources into that neighborhood. Bloom was very proud to play a large role in that. We ultimately installed seven different fuel cell projects this past summer. We had the effect of avoiding brownouts and blackouts in Brooklyn. There were multiple -- I believe over 20 events called this summer that most likely would have gone the other way

The key thing there is that they used a combination of efficiency and distributed energy resources, including storage, solar and fuel cells to avoid a

billion dollars in customer cost. So that's a resiliency effort that had the effect of keeping the lights on, reducing CO2, every one of the measures that they instituted reduced CO2. Reduced, in our case, just like solar we're a non-emitting technology for local forms of air pollution, and did all that at a ratepayer savings -- not cost, but a savings of $1 billion.

The one that I'm most proud of in that group is a project and a place called Marcus Garvey houses. And what it is is a low-income housing development, and we were able to put in a combination of fuel cell, solar, and storage in a microgrid format. And that was one of the projects that helped get common entry through the summer this year.

I bring it up because we have a very different experience in New Jersey. In New Jersey our story is a story of technology, selection, and deselection. And I want to talk through a little bit of some of those selections, and I'll come

back to this. But the key thing is the project that I mentioned in Brooklyn and combines solar and storage and a full fuel, is currently prohibited in the State of New Jersey. And we know this because we have specific projects that we're trying to invest in right now, millions of dollars, private investment that we raised around the world and are trying to spend in New Jersey and are unable to do so.

And according to the electric distribution companies the reason is is because it's contrary to board policy. So we want to really focus on the sort of what I see as a three-part or four-part technology selection and deselection.

Selection came in the form, in our view, of the previous master plan. The Christie administration had a specific technology selection where they selected 1,500 megawatts of combined heat and power. And the critical thing to understand is that Bloom is not a combined heat and power technology and purposefully not a combined heat and power technology. We're focused

on those customers that don't have a matching thermal load and the most efficient way that those customers can generate power.

We think it's really important to recognize that most critical the vast majority of customers don't have a matching thermal load, and matching thermal loads don't correspond with critical facilities. And so when you limit your distributed generation programs to customers that have a matching thermal load, you're effectively excluding many critical facilities, many that are important for purposes of public safety and, you know, could be from a data center to a telecommunications hub, and on and on and on.

So that was the selection we hope will be ultimately changed. We prefer to see a non-selective approach that is purely performance based. We don't think any incentive should be provided to anyone who doesn't first prove that they can perform and that they can achieve the Board's objectives. That's another issue with the

current incentive program, it pays people up front and then there's very little verification after the fact.

So the first issue where we see a deselection is the combination of technologies behind the single customer meter, which is something that the leading companies around the world are doing right now to isolate themselves from outages in the electric grid.

A very simple solution, you don't need to wait for the Master Plan you don't need to wait for 2030 or 2050. We could all get together -- we will be there any day or night if the Board would be willing to call together the EDCs and try to find a way to work it out without having to go through a Rule 1990 process. We'd like to find ways to do this in the least bandwidth intensive manner possible

The second example is the explorative energy. The current situation for us in New Jersey is that a 42.5 percent efficient combustion generator that produces local air pollution and is less

reliable than our technology, and I think that's a proven fact, is allowed to export power to the electric utility. Whereas, a 60 percent non-combustion generator that does not produce any local forms of air pollution and is more reliable is prevented from exporting to a local utility and they will not even take our electricity for free.

It's remarkable, and I've been told by board staff that this is a function of federal law; however, I note that's not the case in New York and it's not the case in Connecticut, and if it was an issue of federal -- that just wouldn't be.

And then, lastly, incentives. You know, I think, again, we focus here on proven performance. We think that the idea of doing cost benefit analyses that take a lot of time and a lot of time to conduct is a mistake, and instead we ought to conduct a reverse auction, state its policies up front, put very high performance requirements in, and then force project developers to bid in a way where the lowest

bid wins. And that way you're going to elicit more value for the Board's dollar.

As it stands right now we're doing a projects, without naming a customer, very large telecommunications companies, where we supply primary power for the AT&T -- oh, excuse me. That's the large company, for a -- switching stations. And in some states they're grid islanding, table the outage of the electric grid, and in New Jersey they're grid parallel. And the reason is because the economic model is different where there's incentives in one state and not in the other.

So I'd really like to see a big focus on resiliency in the Energy Master Plan. I very much appreciate the opportunity to talk today, and I think most importantly, please don't wait until 2030 or 2050 to focus on this issue. Thank you.

MS. CYNTHIA HOLLAND: Thank you. I think maybe a five-minute break, if everyone wants just an opportunity -- you probably want an opportunity to rest your fingers. So we'll be back in five minutes.

I've got that as approximately 11:36.

(Off the record.)

MS. CYNTHIA HOLLAND: I'd like to get started. We do have several more speakers interested in commenting.

I'd like to acknowledge Commissioner Solomon. Thank you for joining us today.

COMMISSIONER SOLOMON: Yes.

MS. CYNTHIA HOLLAND: So our next speaker is Henry Gajda from the New Jersey League of Conservation Voters, and on deck we have Nancy Griffeth.

Oh, he might be outside? Or actually, Ms. Griffeth, do you want to go? Are you ready?

MS. NANCY GRIFFETH: Well, I wanted to wait for him. Whatever.

MS. CYNTHIA HOLLAND: Whatever you're comfortable with.

MR. HENRY GAJDA: Is it my turn now?

MS. CYNTHIA HOLLAND: Yes. Thank you

MR. HENRY GAJDA: My name is Henry

Gajda, G-A-J-D-A, and I'm with the New Jersey League of Conservation Voters. Thank you for the opportunity to comment at this fifth Energy Master Plan hearing and the New Jersey League of Conservation Voters have a rapport with the governor and the administration in passing the clean renewable energy bill and setting our stake on behalf to realize 100 percent clean renewable energy in New Jersey by 2050.

The EMP process needs to identify policies and guidance to preserve the integrity of our energy systems in the face of anticipated and unanticipated impacts of climate change, more specifically the EMP should call for all the infrastructure upgrades and investments to be evaluated and designed to address existing system vulnerabilities and (inaudible) with the least number of hazards present to build the most resilient energy systems possible. For example, using updated flood zone analyses that protect future flood mapping and discourage building insensitive, low-lying, flood-prone, and other measured

high-risk areas.

Moreover, we can not achieve 100 percent of a renewable future if we continue to invest in unneeded fossil fuel projects. It will completely derail all -- our progress in meeting our emission-reduction targets outlining the Global Warming Response Act.

This is further highlighted in the conservation foundation's recent application, which indicates that we have a natural gas capacity available to meet our current and future needs, and we don't need to spend billions of dollars on wasteful fossil fuel infrastructure projects

Therefore, the EMP should consider criteria, such as climate change impacts with social cost of carbon contributions to attaining new -- any new interim goals achieving the 2050 Global Warming Response Act, one that's in all major investments of public monies, including public energy infrastructure and economic development investment, development and redevelopment of state facilities, and then also

Executive Order 215 reviews to ensure that we are ultimately moving productively and efficiently toward our clean energy economy

And then to further facilitate this process moving forward and looking at our state's larger systems, state agencies are essential ultimately to achieve Global Warming Response Act goals and achieving our clean energy bill goals.

And EMP should explore all avenues of how our state agencies can improve and expand their synergies to effectively and responsibly allocate revenues to prioritize -- to priorities that put us on a path to achieve these goals.

In addition, as we ramp up investment in clean energy infrastructure, we need to ensure that the good local employment opportunities are accessible to everyone, especially if major investments are happening near low- and moderate-income and environmental justice communities.

Workforce development programs are essential to build a reliable, productive, competitive, and qualified labor force, and

the EMP should consider ways through public and private investment and collaboration to organize labor to design programs which ensure historically underrepresented communities are involved in transforming the infrastructure of the our state, similar to what has been done in Illinois with the future energy jobs there.

As wind developments spurs along our coast or community solar emergence -- emerges in our urban areas, we need to ensure that the community members of Atlantic City, of Newark, and other areas, which are particularly economically stressed are included in this process to manufacture and assemble such distributed energy resources.

Lastly, and yet quite importantly, just to push a little plug, the administration and legislature should do everything in their power to support, facilitate, and provide funding for the gateway project between New York City and New Jersey. It's arguably one of the most important infrastructure projects for this

region and in the country for decades. Thank you for your time.

MS. CYNTHIA HOLLAND: Thank you.

Ms. Griffeth, thank you. And on deck I have Imelda Foley from the University of Delaware.

MS. NANCY GRIFFETH: Okay. I'm Nancy Griffeth from the Environmental Justice Task Force from Unitarian Universalists Faith Action, and we're also partners in Jersey Renews.

First, I'd like to applaud the BPU for agreeing to two additional sessions. I know this is onerous and, in fact, you're going to have to travel and it's going to be late in the day. Well, I have to travel to these. I do sympathize, and listening to hour after hour of testimony I know has got to be difficult.

And I'd also like to applaud your -- the fact that you have -- well, our primary concern is environmental justice and in the final questions to each set of discussion points you've included questions involving environmental justice.

Okay. Now, after working on the environmental justice issues for a while I've come to realize that one of the hardest things about dealing with these issues is understanding how the circumstances of someone's life that's -- when those circumstances are very different from your own, how they interact with the kinds of things that we try to do to save the environment.

And what I want to talk about today, it's a small thing, a small example, but just an example where there may be some problems that we don't really anticipate, and this is the issue of smart thermostats. And this is part of advanced metering infrastructure, which can be used to better manage the grid, and so fits into the resiliency and sustainability efforts that we might make.

But I have three concerns with smart thermostats: One is cost, a second is consumer decision making, and the third is security.

So as to cost, now I did some

Googling and so on before preparing this and came up with the fact that PSE&G offers a $150 rebate for smart thermostats, which after some study -- we have a programable thermostat at home, but not a smart thermostat, which includes wireless capability, and I believe allows the power company to get data from you and even manipulate the thermostat.

And so I spent some time trying to understand smart thermostats on Consumer Reports and then looking at manuals, and the cost -- well, first, the cost of -- that would leave -- the $150 rebate would leave only about $100 on recommended smart thermostats. So that only is -- and only to me, and I don't know if it's only to a lower-income person. So that's one issue.

Another issue is, as I mentioned, is consumer decision making. And as I said -- so I started out looking up on Consumer Reports to understand what their recommendations are on these smart thermostats. I found out things like not all smart thermostats can work with all

home wiring systems, they require wifi, some of them actually require an iPhone, all of them require a smart phone, some only work with Apple equipment

So, again, we're talking the rebate covers a significant part of the cost of the thermostat; it doesn't cover the cost of associated devices. And even the knowledge that you need those devices to fully utilize the smart thermostat may be hard to come by.

So an earlier presenter mentioned that consumers -- I think in this case larger consumers like hospitals, businesses, really don't like to have to go through a complicated decision-making process when they're purchasing things. Well, you know, not all of us do. I mean, it's time and energy, nobody wants to go through that. And that's certainly the case for lower-income customers as well.

And then the last issue is security, which as a computer scientist, I have to get into this, or a retired computer scientist. So the smart

thermostats -- well, actually, there's another thing I wanted to mention, which relates to this. Energy is providing smart thermostats free in New Orleans, and they will give a $20.00 discount on bills to customers that allow them to manipulate their thermostat.

So that brings in the security issue, which is that -- that punches a hole in the home fire wall. So now somebody has access to your home to a device in your home. And if there's an exploit, that can take control of that thermostat or even your home network -- then the interesting thing is in the energy situation where they're buying everybody's -- the same thermostat presumably, one exploit can attack everybody's home.

Now, for security you always evaluate what are the threats first before you try to figure out what security measures you want to take because basically you want to make the cost of an exploit higher than the cost of anything that can be gained. So that means that home

security doesn't have to be as stringent as bank security.

But if you're talking about one exploit that can damage all of the houses in a state, let's say, that could be very high value to somebody that, say, wants to disrupt a company or that wants to disrupt the government, that wants to damage the credibility of a company or of the government. So that exploit could be a very -- even likeable.

So thank you for listening. That's all I have to say today.

MS. CYNTHIA HOLLAND: Thank you. Imelda Foley?

(No response.)

All right. We have Patty Cronheim from Rethink Energy New Jersey, and on deck we have Ron Cascone.

MS. PATTY CRONHEIM: Good morning. I can still say good morning. My name is Patty Cronheim, and I'm the outreach coordinator for Rethink Energy New Jersey, and I want to thank you for the opportunity to speak with you today. You've already

heard from one of my colleagues, Barb Blumenthal, and you will be hearing from Bob Gilbert a little later.

Today I'd like to speak with you about infrastructure integrity issues. Just a little background, Rethink Energy New Jersey fully supports 100 percent renewables by 2050.

But speaking about infrastructure integrity issues specifically, I'd like to focus on the potential safety risks for New Jersey's -- to New Jersey's transmission pipelines from an overstressing by proposed new gas infrastructure. Sadly, we're all too far aware of a tragedy that occurs when even small distribution pipelines fail, let alone much larger transmission lines.

Recently I had the opportunity to be among a small group of advocates who attend a week-long pipeline safety engineering course in Houston. And this was a pilot program because PHAMSA, the Pipeline Hazardous Materials Safety Administration, wanted the public to have more information, access to more

information. This training helped me better understand and address the basic questions that the people and communities that I work with are always asking me. And the number one question, aside from health issues, is is it safe.

So currently New Jersey's being inundated with new interstate pipeline infrastructure. New Jersey has seven proposed new pipelines and the equivalent of five new proposed compression stations within a 50-mile radius in central New Jersey, just about where we are right now, and this would change the safety dynamics of our existing pipeline system.

This new infrastructure would increase the volume of gas, and in some cases operating pressures and velocities to our existing system. We'd be pushing basically more gas faster, sometimes hotter, through lines. This could lead to increased corrosion rates as well as well failures, and accidents in our states have shown this is sometimes the cause.

We are especially concerned

because pipelines are most vulnerable to accidents in the first five years and as they age. Unfortunately, New Jersey has the perfect storm, we have new proposed pipelines and we have many older, aging transmission pipelines. And these interstate pipelines are not built to New Jersey's higher safety standards to begin with.

New Jersey is the most densely populated state in the nation, and we understand the higher safety standards for pipelines are essential, so since 2009 we have higher safety standards for our interstate lines.

We agree that this is important, and that's why we support a recently introduced assembly and senate concurrent resolution that urges the federal government to require that all interstate gas pipelines constructed in New Jersey are built, operated, and maintained to New Jersey's higher class or safety regulations, something which they are not.

While the Pipeline Hazardous

Material Safety Administration I'm going to call it PHAMSA from now on, is responsible for providing a pipeline safety net for these large lines, there are big holes in that net. PHAMSA only oversees pipelines and compression safety after they're built, they don't evaluate if it's safe to build them in the first place.

And for seven years, since the massive San Bruno accident in California PHAMSA and industry have been dragging their heels on the safety rule updates that were mandated by Congress and the Department of Transportation. No part of the real rulemaking has been completed and it's facing more delays.

While in the meantime significant pipeline accidents have been on the rise -- and this is from PHAMSA data, and sometimes a lot of times industry will cite that this is from excavation and external forces. Well, I just want to say that PHAMSA records show that only 20 percent of pipeline accidents are through some external course of some pipes, 80 percent

is from corrosion, material failure, operator error, and equipment failure. And the rate of these accidents is about 20 a month.

Post-accident investigations have also brought to light that pipeline operators often lack records of their inservice pipeline corrosion status maintenance and testing history.

But despite this poor industry safety history PHAMSA is open to docket to consider industry-recommended loosening of the class location safety requirements for existing pipelines, something that would put New Jersey at higher risk. There's a Monday deadline, comment deadline, for this if the BPU wants to get involved. I know there's some legislators who will be commenting.

Given the lack of federal oversight, especially for proposed infrastructure, New Jersey needs to step in and take a hard look at pipeline safety issues. Because an answer to the question, when people ask me is it safe, I can point

to risk factors, I can point to accidents in other states with similar conditions that what we're facing here

But the truth is that I don't know, PHAMSA doesn't know, the State of New Jersey doesn't know, and in many cases the operators themselves don't know the full condition of what's in the ground and if their new plans are truly safe. It's not knowing that's the problem.

After the tragic accident in Massachusetts this month the Massachusetts legislature ordered a study of the safety impacts on new major gas infrastructure on existing transmission pipelines. New Jersey should proactively conduct a similar study and not wait for a devastating accident to prompt an investigation here.

We need to be proactive and not this currently only looking at problems after they happen. New Jersey needs to require complete and transparent safety analysis that would look at the potential impact proposed pipelines would have on existing pipelines. That review would

include pipeline wall and weld corrosion analysis and new operating gas velocity risk analysis and compression risk analysis.

The people of New Jersey have the right to know the answer to that question. They have the right to know and feel secure about what's under their feet.

Needless to say natural gas is not only a dirty fossil fuel, but also a potentially very dangerous one. We need to be decreasing our dependence on natural gas and moving towards much safer and cleaner sources of energy like wind and solar.

Safety is one of the many reasons why Rethink Energy New Jersey fully supports New Jersey's transition to 100 percent clean renewable energy. Thank you. And I'm available if anyone ever wants to talk safety issues or put our heads together and talk about what's going on, I'm happy to discuss that with you. Thank you.

MS. CYNTHIA HOLLAND: Thank you. Mr. Cascone, and on deck we have Jivahn

Moradian.

MR. RON CASCONE: Okay. With the chair's permission I'm going to be speaking seated for obvious reasons, spinal cord injuries.

Okay. So I'm Ron Cascone, C-A-S-C-O-N-E, with Nexant, I'm a principal with Nexant, N-E-X-A-N-T. This is my second time speaking and accompanying earlier a colleague at another meeting. We intend to put in comments for all of the areas of the final five.

Standalone resilient energy infrastructure, including electric power grid, natural gas supply, and distribution system and the logistics of renewable liquid fuels and gaseous fuels and feed stocks, which has not been discussed very much here, but a gap is closely related to the other four work areas of the EMP initiative, particularly building a modern grid and cleaner renewable power. We have -- we're in our comments distributed generation, we talked about that, complimenting the electric grid and gas

distribution systems, fuel cells and hardening of the infrastructure.

In distributed generation energy storage and -- energy storage are key features of the grid that is modern and resilient. These systems have to be secure against sabotage as well as natural disasters, and that's been suggested here.

Not much to introduce here. I agree with all that's been said about microgrids being -- supporting critical facilities like hospitals, pumping stations, supermarkets, emission critical system such as cell towers and solar farms.

Complimenting the electric grid and gas distribution systems, I think I have something new to insert into this conversation. No one has mentioned the idea of peak shaving when it comes to capacity on the gas grid. This is a common technology that's used all over the country to reduce the size and the volume and make more secure the gas distribution system.

What that means is you use small scale L&G technology, not the stuff that's

delivered in huge tanks from continent to continent to create a tank full of L&G, which then can be re-vaporized to the peak demands and reduce the infrastructure of pipelines that are required.

Now, the interesting thing here is the national labs have developed a technology where you take 500 to -- 200 to 1,500 PSI pipeline pressure, which is let out everywhere at the city gate to about 1,500 PSI. They utilize that pressure drop, which is generally burned across the valve, just wasted, and you run that gas through an expander, and that gives you about 25 percent of that gas as a liquid. You put that liquid in a tank and you can use it for peak shaving, and/or you can distribute it to transportation systems like garbage trucks and buses, and so on, CNG, LNG, and other ways. And you can substitute it for LPG, which is another liquid hydro for industrial/commercial use. This is established common commercialized technology, it's not black art.

The other issue is fuel cells, and

I completely agree that fuel -- I was completely happy with what Bloom Energy had to say. The trouble with fuel cells is that people are focused on PEMFCs, which are the type of fuel cells people are proposing for and -- which need hydrogen, which is a very pure hydrogen. And I am a hydrogen economy energy denier. It's never going to happen, in my opinion.

But solid oxide fuel cells and multi-carbon fuel cells -- so oxide's the type that Bloom was talking about and has commercialized, and multi-carbon is the type that the other folks spoke about from Connecticut. And those are also commercialized, obviously. And they can burn hyrdocarbons. They don't have to be fossil hyrdocarbons, they can be renewable hyrdocarbons.

Right now in this world and in Germany 8,000 facilities are producing bio gas, which is used either as synthetic natural gas by cleaning -- taking out the CO2 that's in it, or is used to fuel waste energy facilities generating electricity.

Korea has similar installations, 7,000, and many other countries in the world. So this is commercial technology. Countries that are interested in greening their energy are doing this. New Jersey should make room for this in its energy plan.

And, finally, when we talk about hardening, and I'm not introducing any new ideas here except that I support the idea of burying power grids -- power lines, and I also suggest that the state get together with cyber security, with federal authorities, international agencies, private industries and other states in this issue of cyber security, which is really a scary, scary issue.

So I think that the suggestions, the EMP guidelines should rely on market data. The market should -- it should be market driven and should develop good data on the existing and future markets for the different forms of energy that we've discussed here, and should evaluate technologies based on what is practical and

not look at -- should not base an energy plan on heroic assumptions about development of technologies that aren't yet developed. Thank you very much.

MS. CYNTHIA HOLLAND: Thank you. Jivahn Moradian from the Princeton Student Climate Initiative and Markian Melnyk from Atlantic Grid Development on deck.

MR. JIVAHN MORADIAN: Thank you very much. I think I can say good afternoon at this point.

First of all, I'd like to thank everyone on the Board of Public Utilities for organizing this event. I think this is something that's a constituent of a democratic society and should be done more often. So my name is Jivahn Moradian. I am a college student here representing the Princeton Student Climate Initiative. Rest assured I will be brief.

I'm here because I help moderate the discussion of coastal resilience at the New Jersey Climate Future Summit, which took place about few weeks ago. And I just want to share some of the considerations

our stakeholders were considering. The stakeholders who were at that focus group represented a very wide range of fields from consulting, to Department of Environmental Protection, to the Rate Counsel, and I felt that a lot of these concerns that were brought up do apply to the topic of sustainable and resilient infrastructure as well.

So the first theme that was brought up, just as an overall situation is no one solution fits all. In the situation we were discussing solution to preventing sea level rise and diminishing the impact of flooding, and we were debating between hard solutions versus nature-based solutions

And one of the consensus was that there's not one set solution that will work in every situation; however, hybrid approaches are often a good way of maximizing the positives of both factors.

One thing that was brought up, though, is it's important to bring up long-term solutions and not do BandAid

patch-ups. So that's just one thing I think is important to take into consideration for this master plan, which is already the case by the fact that we're looking ahead to 2050 as opposed to 2020.

Second big issue was funding. So evidently funding any large-scale infrastructure project is a major challenge. The stakeholders at our group were debating some of the different ways that can be funded. So evidently government funding has its disadvantages because of like bureaucratic systems; however, sometimes it can be more appropriate.

One thing that was brought up is that the private sector is a very good candidate for bringing in solutions, it's just important to make sure that incentives are aligned with the local communities and with the state at large.

Third option -- well, third main consideration is education. A very interesting point that was brought up was that funding infrastructure projects need

to be coordinated with education and awareness programs with local communities because people are likely to respond better be more receptive to change if they know what's going on and where their money is going towards. If people know what projects we're working on, why we're choosing them, and how they're going to benefit in the long run, they're going to be more receptive to the entire process. So we just recommend that in the entire system you continue what you're doing here and just making sure that everyone in the state remains informed of what's going on.

And the final thing that we were discussing were vulnerable groups, in that often the people who are most often affected by climate change, by infrastructure projects, the one who are in most need of the most help are not the ones that have a voice at the table.

So, for example, urban areas tend to attract a lot more development, a lot more investment simply due to the population density. Similarly vulnerable

communities, low-income families are less likely able to attend events like this simply because they can't afford the time and the date.

So just as a final note, and I would like to say, that it's also important that in addition to thinking about who is here and what is being said, we also need to think about who isn't here and what isn't being said. Thank you very much for your time.

MS. CYNTHIA HOLLAND: Would you mind spelling your name?

MR. JIVAHN MORADIAN: Yeah, J-I-V-A-H-N, M-O-R-A-D-I-A-N.

MS. CYNTHIA HOLLAND: And just as a practice point, if everyone wouldn't mind just clarifying what their names are and their affiliations when they come to speak, to make the record clear

And also, thank you, Mr. Melnyk. And on deck we have Tom Gilbert.

MR. MARKIAN MELNYK: Yeah. Hi. Good afternoon. Markian Melnyk, M-A-R-K-I-A-N, M-E-L-N-Y-K. And I'm with

Atlantic Grid Development. We develop electric transmission to support off short wind energy, so my comments here will be focused on transmission today. We submitted written comments, so I'll just hit on a few highlights.

I think it's really helpful when you talk about transmission, to step back a bit and make sure that we are distinguishing between a network which is, I think, what most of us think about when we talk about transmission, and radio transmissions, which is just a single line from a generator to a point on the grid.

And it's an important distinction because when you talk about networks, you get something that serves multiple users, something that's -- serves them over a long period of time. The representative from public service mentioned that some of their facilities are in service now for a hundred years and they've served multiple users over that time. And most importantly it's about providing open access, just like road networks or railroad networks provide open

access to all users. The transmission grid does that and so it supports competition.

On the other side radio transmission is single-user focus, it is controlled by that single user, and so it's closed access and so it end up restricting competition. And when we talk about transmission, I think network transmission ought to be the focus. It by far it serves ratepayers much better. And this isn't just a comment on offshore wind, but it applies to what we're doing in offshore wind.

So this is a discussion about the Energy Master Plan. It's right that we should be talking about planning. Planning helps us avoid mistakes. In the end planning is a lot cheaper and more effective than building things with ratepayer money that we tend not need or are not suited for the long term.

When we think about planning, there are a lot of drivers. And that's transmission planning speak for there are a lot of jobs that you expect a network to

do. We want resiliency, we want market efficiency, lower prices throughout the state.

We need to figure out how to replace these old transmission lines that are reaching the end of their lives. Do we rephrase them with exactly what was there are, or do we resign the circuit so that they do more for us. And we have to accommodate new technology. There was a lot of talk today and in previous sessions about microgrids, storage, controllable loads. The way we address those new technologies can be helped or hindered by what we do with the transmission system.

And, lastly, there is renewables developed, right. So how do we achieve this goal of much, much more renewable penetration on the grid serving New Jersey's load. The transmission network is going to be a key enabler of all of those things, so planning it effectively will matter.

Now, the Board of Public Utilities usually is not in that role of planning

transmission. That is usually something that's done on a regional level by PJM. It's federally controlled. So the Board needs to consider how will they go about doing that.

There are some institutions in the state -- Rutgers and Princeton both have energy institutes that have quite a bit of experience modeling things like the grid interaction with storage and other technologies, and PJM has a process where it will work with the state to plan transmission to address the state-specific policy goals. And so I recommend that the plan think about how to access those resources within the state and regionally to come up with a good plan for the state for transmission.

And, lastly, I want to talk about the alternative to plan, which is an uncoordinated approach, you know, just take the hands off and let things happen the way they will happen.

I've been to several of hearings about offshore wind in New Jersey and I've

heard wind developers argue that they should control the development of generation and the transmission that's needed to deliver that power, that they'll do the best job optimizing that system.

But we've put in place a process where there's competition among wind developers to produce energy for the state, and that's a smart thing to get competition to drive down the cost. But that very competition between them means that they do not coordinate or collaborate, and so they can't plan effectively the transmission that's needed.

If we really want to get to a 21st century grid for the state, we have to step back and plan first. The alternative is going to give us a lot of wasted inefficiency. And we're at the close of September. It's interesting to look back. Fifty years ago almost to this day the first nuclear plants at Artificial Island were starting construction, and so they were built back all the way in southern New Jersey, right, in a very rural area. The

utilities in the state at that time got together and planned a transmission network to move that large amount of new power to the north because, as is today, that's where most of the load is in the state.

So we have an example 50 years ago of utilities working together cooperatively with the state to put in place a large new generated resource with a transmission plan designed to support that. And we're at the threshold of doing that again in the state, a large now clean energy resource. It also needs a clear plan for the transmission that will be the foundation for that resource, helping it to be efficient for the ratepayers.

It's not a small decision. If we look at what 3,500 megawatts of new offshore wind energy would require, that is about $2 billion worth of transmission will be part of that investment. So planning it right is really key to efficient solution for the ratepayers. Thank you.

MS. CYNTHIA HOLLAND: Thank you.

I have Tom Gilbert, and then on

deck Mark Bellin from GTP Partners.

MR. TOM GILBERT: Good afternoon. My name is Tom Gilbert. I'm the campaign director for New Jersey Conservation Foundation and for Rethink Energy New Jersey.

First, we would like to applaud the governor and the Board for setting a goal of 100 percent clean energy by 2050. This is exactly the kind of visionary leadership that's necessary to respond to the enormous threat of climate change and also to propel New Jersey to the front of the pack for a prosperous clean energy economy.

We like to stress that 100 percent clean energy should be defined as 100 percent renewable energy, and the voters of New Jersey strongly agree. A recent Fairleigh Dickinson University poll of over 700 registered voters found that 3 out of 4 support 100 percent renewable energy by 2050; 66 percent do not think natural gas is clean; and 75 percent think the state should invest in renewables rather than

more fossil fuels and pipelines.

We need an Energy Master Plan that ensures we make the right investments in renewable energy infrastructure and that discourages the wrong investments in unneeded fossil fuel infrastructure, such as the proposed Penn East pipeline, as one example.

These would result in stranded assets, saddle ratepayers with unnecessary costs, and further our dependence on natural gas. And let's be clear, natural gas is the primary source of emissions from the electric residential, and commercial sectors in New Jersey, accounting for 37 percent of statewide emissions. In 2015 natural gas resulted in 41 million metric tons of CO2.

Under the Global Warming Response Act New Jersey must reduce emissions across all sectors 80 percent by 2050. And it will be impossible to reach this goal if the spate of newly proposed pipelines and gas-fired plants are constructed, as we need deep decarbonization in the electric

sector in order to meet those targets, and that means less gas, not more.

The Energy Master Plan should identify interim targets by sector every five years that would put the state on a trajectory to achieve the 2050 targets and develop a comprehensive plan to achieve those targets.

A 2017 report by Rutgers in the Georgetown Climate Center identified the need for a 75 percent reduction in emissions from 2012 levels. So we still have a very long way to go, and we are, frankly, not on target to reach those goals.

The Rutgers Georgetown report identified a range of policy options that should be considered, and we urge that the final Energy Master Plan should identify the policies that need to be implemented by the numerous state agencies that review energy infrastructure projects, including the Board and the DEP, to ensure that they use their full authority to meet the 2050 and interim targets.

We simply can't achieve a 100 percent clean energy future by solely focusing on growing renewables, storage, and efficiency, although they are surely keys to success. We must also ensure that unneeded fossil fuel infrastructure projects that will impede meeting the emission targets do not derail our progress.

Transitioning to 100 percent renewable energy is not only achievable and affordable, but it's absolutely essential if we are to meet the Global Warming Response Act targets.

Furthermore, it will reduce costs, create tens of thousands of good local jobs and better protect the health and safety of our communities. Thank you for your work to put us on the path to a clean energy future.

MS. CYNTHIA HOLLAND: Thank you. I have next Mark Bellin GTB Partners. Going once?

(No response.)

Elizabeth Keddy for Suez North

America? Elizabeth Keddy?

(No response.)

We have a list of speakers that registered in advance. So we have Evan Bixby, Pine Gate Renewables?

(No response.)

Evelyn Liebman, AARP New Jersey?

(No response.)

Kevin Hernandez, Scott Madden, Incorporated?

(No response.)

Water Wilson, Clinton Development Partners?

(No response.)

David Weinstein, Archer Law?

(No response.)

Alexa Henao, Sun Run?

(No response.)

George Hay, IRESN? Sorry if I'm mispronouncing.

(No response.)

We have pre-registration. If they identify themselves as a speaker, I'm calling their name, if you didn't have an opportunity to come forward.

Katherine Hamilton, Advanced Energy Management Alliance.

MS. KATHERINE HAMILTON: Hi. My name is Katherine Hamilton, it's Katherine with a K. And I'm the executive director of Advanced Energy Management Alliance. Thank you to the governor's office and the bureau -- Board of Public Utilities and to the committee for taking this testimony and to really talking about sustainable and resilient infrastructure as part of the EMP.

AMA is a trade association whose members include national distributed energy resource companies as well as some of the nation's largest demand response in distributed energy consumers.

Our members support the inclusion of distributed energy resources, which I'm going to call DERs, to achieve electricity choices, cost savings for consumers, contribute to reliability and resilience, and provide sustainable solutions for a modern electric grid.

We recognize that leadership in

New Jersey has significantly driven the growth of distributed energy resources, particularly solar energy demand response, and we think that with the appropriate public policies DER including customer sited solar, energy storage demand response, advanced energy management, and other distributed resources and services can and should play a significant role in the EMP.

We're also convinced that the inclusion of DERs in the EMP in accompanying programs will enable 100 percent clean energy by 2050 while growing the clean energy economy and jobs with resilient and affordable resources that use advanced technologies that are available today to reduce carbon and benefit all citizens of New Jersey.

A key element in determining the appropriate technologies and applications that increase resilience specifically is to define the term. We filed numerous comments with the Federal and Energy Regulatory Commission defining resilience.

And one way to view resilience is to define it in terms of a probability of a defined contingency and the speed of recovery from that contingency. So fail fast, recover fast. Contingencies can vary across regions and states, and the time line for recovery may also vary relative to the cost and benefits associated with the recovery identified in that region.

Moreover, the kinds of resources and the attributes available and necessary to maintain a resilient system in certain physical circumstances will also vary from system to system, geography to geography.

In New Jersey's experience during Superstorm Sandy and during other extreme weather events the state appears to have a well-developed sense of what constitutes those contingencies. In my written testimony I provide some detailed examples of how DERs provide resilience including during the polar vortex, hurricanes Irma and Harvey, and as identified in the ISO New York DER road map.

Sustainability. DERs also

constitute sustainable resources. Demand response and advanced energy management that can be enhanced with energy storage reduce load on the grid. Roof tops along microgrids that use a variety of technology including combined heat and power, for example, provide zero emission generation.

The combination of these technologies and applications allow consumer-sited assets to provide flexible resource to the grid equal, if not superior, in many ways to supply side generation.

AEA members aggregate hundreds of customers currently with PJMs emergency, pre-emergence demand response programs, and as a result, the electricity customers of New Jersey receive millions of dollars a year for participating and supporting the grid.

Our members find that customers are eager to participate in new programs that will help them serve the grid while also generating revenue for their own operations. Most of our members are either

already doing business in New Jersey or are poised to begin such efforts based on previous experience with RECs and on public policies considered under consideration now.

Allowing access to DERs with consumers and opening up the market in New Jersey for customer choice will create jobs in the state and will allow all consumers to benefit from these choices, while reducing the overall consumption of electricity for every consumer.

So we recommend that New Jersey consider the five following policies in the EMP and any other rated state programs:

No. 1, allow DERs to compete for replacement power. New Jersey shall allow DERs to compete in all source procurements including as non-wires alternatives with large central infrastructure based projects such as transmission utilities scale generation.

No. 2, execute on the storage target, the 600 megawatts by 2021 and 2,000 megawatts by 2030, customer-sited energy

storage shall be fully included in any of those programs and incentives.

No. 3, improve RTO market design. We expect that FERC will very shortly issue an order, a national order, for DER that we hope will require each independent system operator to develop a participation model for DER resources. We encourage the state to work closely with PJM on such an order.

No. 4, reform the utility rate-making process. Incentivize New Jersey utilities to embrace a 21st century grid, providing a new rate-making framework to encourage actions that will support the deployment of DERs, a performance-based approach to be used to streamline interconnection procedures, collect and release system and consumer data, incorporate DERs into capital planning processes.

And, finally, No. 5, implement utility peak shaving demand response programs. These programs can be funded through societal benefits charge and designed for the benefits to optimally

outweigh the costs, such as hitting the system peaks effectively. PJM has emergency demand response programs that protect the grid in case of emergency, and New Jersey can implement its own programs to focus on reducing costs to customers. All of these programs will give certainty to customers and investors in order to track investment in innovative technologies and applications for New Jersey.

AMA appreciates the opportunity to present testimony for consideration by the New Jersey administration as the governor develops the Energy Master Plan. Please consider us a resource as you identify specific policies and technology solutions for deployment of DERs across New Jersey.

We feel certain that reliability, efficiency, cost effectiveness and emission profile of DERs can provide benefits to all consumers while growing jobs and stimulating the economy. Thank you again for the opportunity.

MS. CYNTHIA HOLLAND: Thank you. All right. If you hear your name called

and you pre-registered, please come forward. Tom Lynch, KDC Solar? Tomorrow Lynch?

(No response.)

Bernadette McPherson, Millennium Strategies?

(No response.)

Andrew Hendry, NJUA. And then on deck we'll have Ami Morita from New Jersey Rate Counsel.

MR. ANDREW HENDRY: I'll be very brief. Good afternoon. I'm Andrew Hendry. That's H-E-N-D-R-Y, and I'm the president of the New Jersey Utilities Association. Our association represents all the investor-owned or private sector utility companies serving the state across all the various utility sectors, electric, natural gas, water, and waste water.

You've already heard from a number of our members a couple of times, I think, so I'll be submitting written testimony that's much more detailed, and I'll make just a couple of very brief points.

In recent years the utility

industry in this state as a whole has been making about $6 billion a year in capital investment in the state in large part to make infrastructure smarter, more resilient and more reliable, terms you've heard a lot today.

Compare that amount, by the way, to the $2 billion a year roughly that the Transportation Trust Fund expends on transportation infrastructure in the state and you get a sense of the magnitude that the work that the utility industry does and it's important for our economy and for the functioning of our state.

Of course, most relevant to the EMP is investment and energy infrastructure. There our companies that have been making and will continue to make -- to enhance, again, reliability and resiliency in the face of severe weather, to accommodate and increase the plan of renewable energy and distributed generation, and there is potential costs obviously there as well, and to replace, as it has been mentioned, aging infrastructure

and more stronger and smarter infrastructure

I was going to give you some examples of what our companies have been doing, but you've heard plenty of those today, so I won't repeat them.

The state will look forward obviously in the new EMP to a future with more renewable energy, more robust energy and efficiency programs. By the way, the utility industry is going to play a key role in leading that energy efficiency effort under the new clean energy law that was signed into law earlier this year and with more distributed generation.

But at the same time we're likely to face a future with more and more severe weather and greater demands on the system and thus a greater need for capital improvements and support for capital improvements that we've been seeing from the state.

And so, accordingly, we urge you to have the EMP explicitly recognize that regardless of the portion of the New

Jersey's load that's served by renewables or when we hit 100 percent and all of the factors that are considered in the EMP, that the state continue through the EMP to support utility reliability and resiliency capital investment, and hand in hand with that recognize the need for regulatory and rate-making mechanisms that minimize disincentives and enhance incentives to those kind of investments.

A great example of incentivizing utility infrastructure and investment to the Board's adoption earlier this year of regulations to establish the new five-year infrastructure improvement program, or IMP, which was an excellent step forward and kudos to the Board and to the commissioners for adopting that. The accelerated recovery mechanisms like that help to encourage investment while at the same time the IFP and the longer capital plans allowed through the IEEP will help to cut down on inefficiencies that were present in the system earlier.

However, at the core of our

rate-making system is -- the last speaker touched on, a system that ties revenue to the number of kilowatt hours sold, the number of therms sold. There's still an inherent disincentive to the deployment of IME to renewables and energy efficiency programs, and we think the EMP should recognize that this conflict does exist, it can have a dampening effect on capital investment, and that the EMP should encourage continued exploration of alternative models for revenue recovery including what's being done in other states around the country.

On a related note, you've already had a hearing on transportation, but I feel like I can't leave a discussion on infrastructure without pointing out the utilities really can play a critical role in the deployment of charging infrastructure for EVs and CNG-fueled vehicles.

We feel the EMP should recognize the important role the utilities can and will play in this area, and we feel that

all options need to be on the table when it comes to construction and ownership of charging infrastructure, and that's the best way to ensure that infrastructure will be deployed where it's needed most, not necessarily where it's more economic.

On one final note we encourage you to recognize through the EMP the deployment of renewable energy and the use of cleaner burning cost-effective natural gas for generation and for heating are not mutually exclusive. It is certain that natural gas will continue to be a necessary compliment to intermittent renewable energy sources for many, many years to come in the state.

And, accordingly, we do encourage you to provide that the EMP contain a clear message that every natural gas transmission project, whether interstate or intrastate, should be judged individually based on its own merits.

Some of the comments that were made today, from my perspective, reinforce the need to have an individual project by project perspective and body. In EMP, as

there were mischaracterizations, I would argue, made. The purpose of a couple of the interstate pipelines that the Board has reviewed as being driven by utilities having an interest in developing more capacity, whereas one of the projects mentioned was to create additional resiliency and source diversification. Another is to convert a whole plant to a far cleaner burning natural gas-fired plant and to provide an additional fee to the southern area of the state that only has a single feed serving it now.

And I do appreciate that a prior speaker mentioned PHAMSA and the class that PHAMSA provided. It's my hope that that class gets reiterated, their public position that pipelines are, in fact, the safest form of energy transmission in the country.

So with that, thank you very much for your time. We'll be submitting more detailed comments, and thank you for your patience and efforts.

MS. CYNTHIA HOLLAND: Thank you.

Ami Morita from New Jersey Rate Counsel, and on deck we have Sam Weinstein from the Princeton Public Affairs Group.

MS. AMI MORITA: Good afternoon. My name is Ami, A-M-I, last name is M-O-R-I-T-A, and I'm from the New Jersey Division of Rate Counsel.

Our office represents the interests of the utility ratepayers in public utility matters involving central services such as electric, natural gas, water, waste water, and telecommunications.

As stated in previous EMP stakeholder meetings, Rate Counsel's overarching goal is to help New Jersey utilities provide reliable service at reasonable rates for residential, commercial, and industrial customers

Our comments today are more general in nature. We will provide more detailed comments on October 12th. Generally, EMP's goal for 100 percent renewable energy before January 2050 is laudable. However, the state cannot afford to do every project that may further the

state goals.

To keep the utility rates affordable for consumers New Jersey needs to develop and implement a deliberative and strategic process that keeps cost effectiveness in mind as we work towards the state's 2050 goals, since New Jersey ratepayers and taxpayers will ultimately bear the cost of this transformative process.

Turning to PJM and wholesale market issues, the state must be aware of the federal wholesale market as it implements any program. The cost of transmission continues to increase at significant levels increasing costs to ratepayers. Affordability remains a key element of the Board's statutory mandate, and the cost emanating from the federal market must be considered.

Additionally, PJM and FERC are in the process of making major changes to the PJM capacity market, the energy market and possibly how all generation is compensated. These changes will have the cost and

implementation implications to New Jersey, and the state must continue to monitor these developments and be prepared to be flexible as it implements its EMP agenda.

As a member of PJM, it is the position of Rate Counsel that costs for grid upgrades should be allocated fairly among the beneficiaries of the upgrade and operating of the grid. Any cost for a project built in New Jersey by providing benefits to an entity in New York ISO should be borne by the beneficiaries of the project, regardless of their geographical location.

With respect to state policy as a whole, New Jersey has already was allowed its electric distribution companies, or the EDCs, to modernize and reinforce its distribution system. Most notably multiple EDCs have implemented distribution automation and other modern technologies to improve system reliability during major weather events and under normal weather conditions. Billions of dollars have already been approved and spent to achieve

better outcomes, and if or when these improvement are tested, they will certainly put us in a better position.

In addition, New Jersey has adopted new vegetation management rules that help improve the resiliency and reliability of the distribution system without the need of drastic changes to existing infrastructure. In this sense the existing regulatory regime is well equipped to meet the state's 2030 and 2050 goals, and we believe New Jersey regulatory paradigm such as decoupling are not necessary to ensure reliability, resiliency, or sustainability.

Now I would like to turn to the advanced meter infrastructure. While the utility and others tout the benefits of AMI, none of them have been able to demonstrate to date the broad scale deployment of AMI produces more benefits than cost. Indeed, an industry journal recently reported that regulators in Kentucky, Massachusetts, and North Carolina have rejected the implementation of AMI

meters because of poorly structured business case.

In rejecting AMI programs the commissions in those states made clear that viable AMI programs should show that AMI meters are, one, needed; two, reasonable cost options; and, three, taking full advantage of smart meters advanced capabilities.

In New Jersey the Board approved a Rockland Electric AMI pilot program a little over a year ago, and under the program Rockland Electric is currently installing AMI meters to residential and commercial buildings for all 70,000 of its customers.

After the program is up and running the company may seek recovery of the costs in a base rate case to provide an opportunity for the Board to ensure that the costs are prudent and there are benefits for ratepayers.

While that pilot is being conducted the Board placed a moratorium on new AMI applications. Rate Counsel is very

interested to learn how the Rockland Electric pilot turns out and what it shows about the benefits and costs of AMI.

Rate Counsel strongly believes that any AMI program approved in the state must demonstrate that it's cost effective before being deployed since ratepayers are -- ultimately bear the cost of implementation.

In addition, concerns as to who ultimately owns the data compiled by the AMI meters and how the privacy of the customers will be protected must be addressed.

Finally, the transmission of the state's infrastructure to be more secure, resilient and modern may result in stranded costs. For example, replacing of the utility meters may increase stranded costs because the existing meters that the AMI will be replacing will no longer be used.

Rate Counsel, therefore, applauds the Board for its deliberate and mindful rollout of AMI. By implementing a small scale AMI pilot program first we can learn

from the successes and mistakes that determine whether AMI should be implemented elsewhere in the state.

Cyber security. Another consideration for secure and modern resilient infrastructure is cyber security concerns. Increased automation and communication of the electric grid creates opportunities for cyber security breaches. The state should provide a forum for the sharing of best practices and information so that entities can address cyber security issues prior to the implementation of more advanced technologies.

And then workforce development. The position posed at the board staff in connection with jobs primarily is based on utility staffing issues. We agree that it is essential to have recruitment and training programs to ensure continued adequate staffing.

However, when considering job impact of programs, it is also important to consider the impossible negative job impact if utility rates become unaffordable.

Losses of jobs because businesses cannot afford to stay and operate in New Jersey will have a dampening effect on New Jersey's economy.

Without question there are positive benefits to many of the policies under consideration, but this must be balanced against the corresponding negative impact that uncontrolled spending will have on the state's employment opportunities.

And then last topic, environmental justice. As the state grapples with the EMP mandates the impact on disadvantaged communities must be considered. Benefits should be applied fairly and cost measurements must be at the forefront of decision-making process. We must continue to have -- how will the cost of new technologies impact customers' bills, especially for low-income people.

Rate Counsel continues to advocate for the least cost, most-effective alternatives. Rate Counsel also maintains that traditional rate-making costs allocation, where the ratepayers that cause

the utility to incur costs, should ultimately be responsible for paying for that cost, should guide implementation of these policies. In that way the impact on disadvantaged communities and all ratepayers can be fairly balanced. Thank you.

MS. CYNTHIA HOLLAND: Thank you. I believe we have 15 more minutes, so Sam Weinstein?

(No response.)

Brian Vayda, Public Power Association New Jersey.

(No response.)

Jaci Trzaska from Rutgers University?

(No response.)

We had Julia Bovey?

(No response.)

All right. Then we'll call Gerald Foley, and on deck we have Jim Benton, and I believe at that point we'll probably take a short break.

MR. GEAROID FOLEY: Good afternoon. I'm Gearoid Foley. I'm with

the Department of Energy's CHP technical assistance partnership, and I appreciate the opportunity to speak to you today. I will keep this brief. We had submitted written comments. I'm going to just cite a couple of excerpts from that and just address some of the questions that were posed for this session.

Combined heat and power technologies hold enormous potential to improve the nation's energy security and resiliency and reduced greenhouse gas emissions. CHP supports a move to a cleaner energy economy and the creation of green jobs.

The Department of Energy has long challenged CHP technologies to harness the full power of CHP to help the nation meet its energy goals.

CHP, as part of a community-based hybrid microgrid, including renewables and battery storage, represents a cost-effective means of providing resilient base load power and thermal energy for the local community, including critical

infrastructure in an accessible way for all.

The advancement of combined heat and power is part of the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy's mission to create sustained American leadership in the transition to a strong and prosperous American power by domestic, affordable, and secured energy.

And I'll -- they're citing from the written comments, I think they're relevant to the proceedings, and I'm just going to address a couple of issues related to sustainable and resilient infrastructure.

So combined heat and power, CHP, is a non-warrant (ph) alternative that we've heard mentioned a couple of times today, and it's a non-warrant (ph) alternative that provides affordable, resilient, and clean energy.

So in relation to the first point in the discussion items as well as a number of these in the general section, CHP is

part of a microgrid, is an alternative to investing in the infrastructure, in the existing infrastructure, or even updating or replacing existing infrastructure. It also provides an inherent resiliency, the regulatory assistance project, RAP, which is a very good organization, a useful organization, as we go through the process

As stated in the past, that it is just simply not feasible from an economic point certainly and perhaps a technical perspective as well to fix the grid. To achieve the sustainability that we're looking for in the future, you must do it locally at the point of use. And that's where, again, combined heat and power, distributed energy, distributed energy resources, hybrid microgrids all play an important role as we move forward.

Another issue that has been raised is the issue of stranded assets. Here again combined heat and power, I think, provides a good answer as we move forward towards 100 percent renewable future, but understanding that, as a number of speakers

have said, there are steps that need to be taken between here and there.

Combined heat and power provides the most efficient use of fossil fuel at a location, it's resilient, and it is typically -- has about a -- it's about a 15-, 20-year investment horizon. Most of these projects are built around 15-year type investments from a return-on-investment perspective the last 20, 25 years.

So it is an interim step, it doesn't become a stranded asset because I think we can get to use that asset successfully as we move towards 100 percent renewables and retire that asset without actually having costs.

And just, finally, on workforce development, you know, New Jersey has historically been a center of engineering in the broad region in the country. This is certainly an area, as New Jersey takes leadership in moving forward, where I think we have a lot to gain, and one of those areas is certainly bolstering and

attracting the engineering community to deal with the issues that New Jersey is kind of heading towards dealing with, integration of distributed energy resources throughout the grid, resiliency, all of these issues. You know, that's an area that I would certainly recommend we look at, helping the industry develop a center of excellence here in New Jersey. Thank you.

MS. CYNTHIA HOLLAND: Mr. Benton?

MR. JIM BENTON: Good afternoon. My name is Jim Benton. I am the executive director of the New Jersey Petroleum Council. We are located in Trenton, New Jersey. It's a division of the American Petroleum Institute with a long history of representing the petroleum and natural gas industry here in the state.

We are a comprehensive association engaged in all facets of energy right here in New Jersey including refining transportation, research development, and of course, marketing of all types of fuels.

We appreciate this opportunity to

offer our perspectives at there pivotal time in the effort to advance America's energy leadership and issues that impact New Jersey. We firmly believe that success in meeting the demand for improved living standards and meet forecasted population growth in New Jersey will be the development of sound energy policy.

Governor Murphy stated if we don't get the economy right, we do not get New Jersey right. To that end we would add simply if we don't get energy policy right, we won't get the successful state economy that we all hope for. So let's see what we can do to put our heads together and join in the constructive dialogue to get this job done.

Energy from all sources will be required to contribute to realize a secure energy future for New Jersey residents. Our businesses assure our contributions to America's energy growth. The cornerstone of any successful energy strategy will be the responsible diversification of our natural energy supplies. This will allow

consumer demand and marketplace choices to integrate alternatives and new fuels into the energy landscape without governmental subsidies and mandates that jeopardize the future of larger, sufficient secure supplies.

Commercial and industrial ratepayers consume 64 percent of the electricity in New Jersey and have a very distinct invested development in the state's energy policy. Its implications on competitiveness and any subsequent ratepayer impact are key.

So let's take a look and begin with some fundamental facts regarding the presence of the energy industry here in New Jersey. We are ranked 47th in terms of geographic size, yet we are 13th in total energy use. New Jersey has three operating nuclear power plants, two fully operational oil refineries, and over 3,600 retail gasoline stations. Overall, our energy industry employs more than 30,000 people here in New Jersey.

In northern New Jersey between New

York and New Jersey there are over 40 million barrels of refined product storage capacity making it one of largest petroleum product hubs in the United States according to the energy information administration.

New Jersey refineries located along the Delaware River are part of the nation's largest petroleum product hub on the east coast. The refinery in Linden, New Jersey, is the largest on the east coast.

New Jersey is home to a sophisticated network of liquid pipelines. One liquid pipeline runs from the Gulf Coast in the northern terminus in Linden, New Jersey. New Jersey is currently home to an extensive network or natural gas pipelines and is presently planning for new and sophisticated gas pipelines to help support our effort to meet new and increasing demand for natural gas throughout the state.

Ongoing initiatives to build newer and more resilient grid while protecting ratepayers from higher costs are underway.

And we recognize the existence of an abundant, affordable domestic natural gas region in nearby Pennsylvania and in the Marcellus Shale region, giving New Jersey a distinct stiff competitive advantage to be among the most affordable energy supplies in the world.

New Jersey presently has over 3,600 service stations throughout the state, and on an average day it dispenses almost 11 million gallons of motor fuel to those who reside, work, travel to and from New Jersey. It's important to recognize that those products continue to involve and improve.

New Jersey presently recognizes adherence to a federal motor fuel standard that follows a federal recipe that reduces mobile source emissions in what is the cleanest-burning gasoline permitted under federal law. Diesel fuel has similarly undergone a major transmission by removing almost 90 percent of sulfur. In summary, these products are continuing to change and improve.

Similarly, energy demand will continue to grow in the coming decades and New Jersey energy policy should continue to anticipate that very clear and certain development. A comprehensive all-of-the-above energy strategy includes investment in energy sources such as natural gas compressed or liquified, improving and expanding the use of biofuels, the challenges of investment and solar and wind technology, the continuing expansion of cogeneration, the fulfillment of a promise, the continuing delivery of nuclear energy, and improved vehicle technology.

PJM, in written testimony before the Senate, stated that the production and delivery of electricity in the state is as reliable today as it has been in its history and will continue to be so in the future. A fuel mix is more diverse than it has ever been historically. We wish to continue to promote that innovation and flexibility in our New Jersey energy policy that advocates for competition in free

market rather than subsidies and mandates.

As PJM also observed, the electricity industry and wholesale power markets are evolving. However, as a state within PJM, New Jersey need not address these challenges alone or in a vacuum.

On the other side of the equation energy also mixes with our environment. Energy emissions have peaked and have begun to decline even as demand for energy grows. New Jersey has one f the cleanest power sectors in the country, ranked 46th in the lowest CO2 emission, 47th lowest in S02 emissions, 47th lowest in NOX emissions, and the 8th highest in retail energy costs.

New Jersey is already meeting emission targets for 2020 under the state's Global Warming Response Act, and our CO2 emissions are lower than 7 out of the 9 RGGI states trailing only Vermont, which doesn't have a power sector, and New Hampshire, which is nowhere near the intensity of population or business development here in our state.

In summary, the New Jersey

Petroleum Council looks forward to working with state policy leaders in the development of a public policy framework to ensure our future energy security. We, as a state, need to promote better understanding of the energy challenges that we face in the future, and we will work to position New Jersey in order to enhance our energy supplies and remain on the cutting edge of advanced technologies.

We commend the Murphy administration and the Board of Public Utilities for providing us the opportunity to help shape a master plan that is balanced in its approach, responsible for recognizing the needs of our New Jersey citizens, the manufacturing and industrial sectors, and depend on a secure and reliable energy policy to live and prosper. Thank you.

MS. CYNTHIA HOLLAND: Thank you. Recognizing it's about one o'clock now, folks may want to grab something short to eat. I'd like to propose a 30-minute break. I'm going to keep it to 30 minutes.

I will say we have about 20 persons on the pre-registered list of speakers and about 11 names on index cards for folks that have registered today, so that's approximately 30 speakers. So we do want to keep this moving along. So even if we can just keep it to 30 minutes, I'd appreciate it. So approximately 1:30. Thank you.

(A lunch recess was taken from 1:05 to 1:36 p.m.)

MS. CYNTHIA HOLLAND: Thank you for coming back from lunch. We're going to get back started again in just a few moments, so I'm going to call some names. If there are any folks in the hallway that are interested in speaking, if you could just alert them. We have asked BPU staff to let people know that we're getting back started again.

I will provide an opportunity for further comments at the end if a name was called and somebody wasn't present, so just, you know, if your name was called and you missed it, you'll have another

opportunity to speak at the very end.

MS. CYNTHIA HOLLAND: Gaylord Olson, Seasonal Storage Technologies. Okay. Thank you.

MR. GAYLORD OLSON: Hello. Good afternoon. My name is Gaylord Olson, O-L-S-O-N. I'm not representing any specific organization, and these opinions are pretty much just my own. I have spoken here before, so I apologize if this seems too repetitive.

But there are probably a number of new people in the audience. And so at any rate I've been looking into -- some ideas related to large scale energy storage and renewable sources of electricity. And in my opinion worldwide we have the choice of, I think, only six forms of electricity generation that are totally able to eliminate fossil fuels, and that could be possibly cost effective in large scale.

And I'll just give you the list sort of in order of what I think are the likely ones to come into play. Some of these we already have, some not so much in

this country.

But No. 1 on my list is wind power. And we're well on our way to having fairly large scale offshore wind farms off our shore, all along the Atlantic actually, other states up and down the coast. And so if you look at wind maps, you will see that that is a very good resource, also around the Great Lakes.

So my No. 2 on the list is solar. Of course, we have a lot of that already and more on the way.

No. 3 on my list is hydroelectricity. Not so much large scale here in New Jersey, but other places not too far away.

No. 4 on my list is nuclear power, which is somewhat controversial. Some people say, no, we want to get rid of all of it and not have any of it come back. But on the other hand, there are people researching safer, less expensive, smaller scale nuclear generation methods, and they may be successful. We should give that a chance as to be another significant

continuing large-scale electricity generation method without fossil fuels.

No. 5 on my list is biomass, and that is another controversial issue. Some people say no way, never because it's not renewable enough. On the other hand, it is coming into use on a very large scale at the largest electricity power plant in the United Kingdom, supplied England and Scotland. If you want to look it up, the name is Drax, D-R-A-X, the Drax Power Station, along the east coast of England.

They're converting massive coal-fired power plants into biomass with wind pellets. And as to whether or not it's fully sustainable in terms of long-term carbon emissions, that needs to be looked at carefully. But there are ways to have biomass production where you're pretty much guaranteed that over a short period of time, like seven years, there will be no net emissions of carbon dioxide.

Basically this would be like a eucalyptus forest in Brazil where they harvest the trees every seven years. So

every seven years the carbon dioxide that's emitted is equivalent to the same amount of carbon dioxide -- or carbon atoms that get back into the trees.

So the last item on my list goes by the name of geothermal, but I'm talking about very deep earth geothermal, sometimes called hot rocks, where the rocks are hot enough to generate steam immediately, and you can run steam turbines.

Now, that's -- in pretty significant use in California, Nevada, Idaho, western states, and people at Princeton University and Cornell are looking into the economical ways of doing very deep drilling to have the same capability most anywhere in the world. So we'll see if that becomes successful or not. But it is already fairly widely used in different countries.

If we want to look further into the future, I suppose in the year 3000 we might have fusion power and hydrogen, and those kind of things, but that's beyond my pay grade to speculate about.

Also, I should mention many of the things that I'm going to comment about here are already on the Internet, and if you want to read it, it's a short article on the New Jersey Sierra Club website. It's on page 13 of the latest news letter that the Sierra Club puts out every three months. So it's -- it happens to be the bottom of page 13. And my e-mail is address is there. So if you have disagreements or complaints, by all means send them to me. I'd be happy to read them.

I'll make just a few comments about some of these items and then come back to the issue of -- and also talk about large-scale energy storage. Actually, maybe I'll talk about that right now.

Most people when they hear the term "energy storage," they immediately think about batteries. Yes, that works fine for automobiles, for cell phones, et cetera. It does not work well at all for very economical utility scale, large storage.

The only possible way to do that currently is pumped hydroelectricity. And I mentioned that before at previous meetings here, but I'm pretty sure you'll find that that is the case.

I'll just give you a quick little arithmetic lesson about that, or exercise, I should say. And if anybody wants to follow along with this, they can do it on their smart phone, just go to Wikipedia. And we want to compare a couple of methods of energy storage.

So one method is to look at the batteries that are being put into the plug-in electric vehicles. The most widely used electric vehicle today is the Nissan Leaf, and there have been about 300,000 of them put into use in our -- mostly on the road today. Each of those automobiles has a 20 kilowatt hour energy usable battery capacity for its traction battery. So 20 kilowatt hours. Multiply that by 300,000 and you have a total energy of 6,000 megawatt hours. Pretty large energy in all those batteries.

Now, if you look at what is currently the single largest pumped hydro energy storage facility in the United States, it happens to be in Virginia, it's called Bath County pumped hydro. It's also in Wikipedia, you can look it up. Their energy storage capacity is not 600 hours megawatt hours, it's 24,000 megawatt hours, in just that one facility.

There are dozens of those around the country and even many more dozens around the world. So, as you can see, there is almost no way that battery can compete in any situation within the next foreseeable number of years.

The only thing holding back pumped hydro as a much better and cost-effective way to get energy storage is the environmental and regulatory constraints. It takes about eight to ten years to get all of the approvals, local, state, federal, to get a pumped hydro system from the conception to actual operation. That's way too long. Investors cannot tolerate that length of time.

So if any of you have a chance to do something to shorten the length of time between conception and use, that would be a tremendous help to get that massive energy storage put into use. And that would allow for solar and wind and storage to be the total source of electricity in the year 2050. I'm very optimistic that could happen. Thanks for listening.

MS. CYNTHIA HOLLAND: Thank you. Diane Slifer, PJM Power Providers, and on deck we have Dave Pringle.

Just a reminder please state your name and spell it for the court reporter. I apologize.

MS. DIANE SLIFER: Diane Slifer, S-L-I-F-E-R. Thank you to the EMP committee for allowing me to speak today. I'm Diane Slifer. I'm here today on behalf of the PJM Power Providers group known as P3.

P3 is a non-profit organization made up of power providers whose mission is to promote properly designed and well-functioning competitive wholesale

electricity markets in the 13-state and Washington, D.C., region served by PJM interconnection. Combined P3 members own more than 84,000 megawatts of generation assets in PJM, produce enough power to supply over 20 million homes, and employ over 40,000 people.

P3, like this committee, is concerned and committed to a sustainable and resilient infrastructure, the title of today's meeting. As this committee is aware, New Jersey is not an island on its own. Rather, New Jersey is part of the largest electric grid in the country, a grid that is benchmarked and looked to by other companies, PJM. New Jersey is a state within PJM and does not need to address challenges alone or in a vacuum. Further, PJM is overseen by FERC, the Federal Energy Regulatory Commission.

Currently PJM markets are working well. Power prices are at historic lows, reliability is high, air emissions have been reduced, and the generation mix is diverse. Sulphur dioxide, nitrogen oxides,

and carbon dioxide emissions from power plants in PJM have dropped quickly in the last decade as more efficient generating facilities, many of which are in New Jersey, have replaced older, less efficient ones.

Specifically, as PJM reported in the March 2018 Emission Rates Report, the PJM system average of carbon dioxide emissions from 2013 to 2017 have dropped from 1,112 pounds per megawatt hour in 2013 to 948 in 2017. This is a 15 percent decrease.

Similarly, sulphur dioxide emission rates have dropped from 2.20 to 0.79 pounds per megawatt hour, which is a 65 percent drop in those same four years. And nitrogen oxides dropped from 0.95 to 0.66 pounds per megawatt hour, a 31 percent drop.

This trend in reduction in emissions is likely to continue as coal plants continue to retire. These emission reductions in PJM are a powerful illustration about achieving environmental

goals in a competitive regional electricity market.

As New Jersey begins to draft and implement its new Energy Master Plan, P3 urges New Jersey to pursue its clean energy goals consistent within the market structure and not look at these goals within a vacuum. New Jersey can pursue its energy goals through the currently existing market base construct rather than the state dictating which resources should be favored.

New Jersey has to decide what it wants. Does it want to participate in a competitive market with market-based solutions with the benefits of a sustainable resilient infrastructure, or does New Jersey want to pick the resources it favors and get back into the generation business and risk increased costs to New Jersey ratepayers, a concern also expressed today by the New Jersey Rate Counsel.

As New Jersey is reviewing a new Energy Master Plan, it has an opportunity to either learn from the past or repeat a

mistake. As the committee knows, the Long-Term Capacity Agreement Pilot Program, known as LCAPP, passed in New Jersey seven years ago. Seven years later we see that LCAPP was unnecessary and was deemed unconstitutional.

Fortunately New Jersey was prevented from making a large mistake in this instance. As the facts show, the market price was much lower than the would-be LCAPP subsidy would have been. This is evident in looking at just one of three plants that were part of the LCAPP plan and looking at just the one year of the 15 years committed.

The contract price of the capacity approved for New Jersey for CPB Shore, which was one of the three new natural gas plants chosen in 2011 for a subsidy, in 2018 it would have been $303.45 per megawatt as compared to the market clearing price that actually took place in EMAC as $120.00 per megawatt day, almost triple the difference.

If the New Jersey capacity

contracts had not been judicially invalidated to the unconstitutionality of the LCAPP, New Jersey ratepayers would have paid $48.5 million more this year than the market price for the 725 megawatts of capacity associated with that facility.

In this case New Jersey made the choice to pay nearly $50 million more for 725 megawatts than the market price in just 2018 for just this single year. And looking at six years, total capacity premium for New Jersey ratepayers would have been -- the New Jersey ratepayers would have been obliged to pay, for just this one plan again, from delivery year 2016 to delivery year 2021 over $231 million. Again, this is just an example of one plan out of three that were in the LCAPP plan.

This is a very stark example of how competitive markets had a vastly different price outcome than the state picking from resources through a subsidy program. This example shows what happens when programs go outside of the market.

This leads to inefficient and costly results with the ratepayers bearing the burden of the increased costs.

P3 urges the EMP committee to not rush into another energy plan mistake such as LCAPP. P3 believes that New Jersey has a unique opportunity to thoughtfully draft its new Energy Master Plan and can take the time to fully understand the market dynamics that are occurring in today's markets. Be aware of the wholesale market, as noted by the New Jersey Rate Counsel today. Appreciate the efforts that are currently underway at PJM and FERC. Have a deliberative and strategic process, as requested today by the New Jersey Rate Counsel, and develop thoughtful, informed, and sound energy policy for the Garden State.

Again, as I highlighted earlier, emission rates in PJM for CO2 SOX and NOX are a powerful illustration that environmental goals can be achieved in a competitive regional electricity market. Thank you for this opportunity to speak

today.

MS. CYNTHIA HOLLAND: Thank you. David Pringle, and on deck we have Thomas Jams or Jams Thomas.

MR. DAVID PRINGLE: Thank you. I'm here today, David Pringle. I'm here representing Clean Water Action, which is a national environmental group with over 100,000 members here in New Jersey.

Governor Murphy's vision and action to get to 100 percent clean energy by 2050 will restore New Jersey as the national leader on these kinds of issues. And it's not just under the climate, dealing with the climate crisis, but it's critical to public health, private property, economic growth, and jobs.

While Hurricane Sandy was catastrophic in so many ways it was not as catastrophic as it could have been if it was in the dead of winter or in the middle of the summer when energy use is much higher than when Sandy did this, and it would have been even more life threatening. Like the Jersey Shore Newark was faced --

Jersey City and Hoboken was faced with tremendous destruction of homes, many feet of water, loss of power, raw sewage. But it's Ironbound residents in Newark were also exposed to many toxics from chemical sewage plants overwhelmed by the surge waters that ended up in neighborhoods and homes making people sick.

There needs to be better emergency plans for these hazardous facilities, many of which lost power and were understaffed during the crisis. We have seen this more recently with Hurricane Florence, coal plants shut down, workers trapped, nearby coal hatch and lagoons overflowed.

We saw it with, thankfully now, as of last week Oyster Creek has shut down, but Sandy came awfully close to devastating consequences down there too, coming within a couple feet of electricity pumps.

If we are to create a more sustainable and more resilient energy infrastructure, we need to plan for the extremely hazardous situations mentioned earlier and take steps to address them.

I'm just going to highlight seven steps. There are many more.

No. 1, we need to be getting power back quickly to all neighborhoods regardless of color, income, and geography. Newark residents were without power in some cases much longer than the Jersey Shore, which got a lot -- obviously a lot of attention.

No. 2, having independent microgrids that allow complexes, institutions, and neighborhoods to stay online and with power regardless of a system being damaged.

No. 3, getting back online faster with emergency power systems for prioritizing -- and in prioritizing the most vulnerable, the elderly, the ill, and disabled.

Having neighbor-to-neighbor check-in systems and broadcasts over alert systems via text message and other means about status of power, where to get services, power, and shelter, especially, again, for the most vulnerable.

Ensuring that we have the authority to take renewable energy systems off the grid and put into local and onsite uses back-up power when larger systems are down.

No. 6, taking steps to minimize the use of gas and diesel-powered generation -- generators, which are unsafe, contribute to greenhouse gases and other co-pollutants as well as being obviously difficult to assess during power outages when pumping stations do not work anyway.

And, finally, we need to obviously really emphasize more decentralized renewable energy and demand energy efficiency, demand response, conservation, and policies not by building more fossil fuel infrastructure as the pipelines are being proposed. New Jersey gas reliability line, the South Jersey Gas line, Penn East, as well as power plants like in the Meadowlands, Messanetcong (ph), Woodbridge, and the like compressor stations.

We need to be investing in clean energy and reducing demand to create

redundancy in fossil fuels and nuclear power, and related to nuclear power as previously testified we have limited funds. Not only is the next generation nukes not viable, we need to phase out as renewables ramp up the existing ones. They shouldn't be getting a penny more of the public subsidy than they truly need to operate, and only then again if we need the power and we should ratchet -- as we're ratcheting up, we ought to be ratcheting those down.

And related to that, and in my final comment, I'm pleased that they announced earlier this week that two additional hearings in Newark and Camden at better times and places for environmental justice communities, but do have two concerns around that.

The first is there's a conflict that they are both -- the time and date are the same time as the first two of the three zero-emission credit hearings and -- but in different locations. So that's unfortunate.

And second is I hope that notice needs to be proactive, not just reactive. I hope the Board is being very aggressive in getting the word out about these hearings. There's been very little -- it was announced Wednesday, so the first hearing is only a week away.

You know, a critical component of environmental justice is getting buy-in, but you don't get buy-in by being reactive, you have to be proactive. So I hope you're already in contact with several environmental justice groups, the DEP advisory counsel, environmental justice EJAC, the Ironbound community corporation, New Jersey Environmental Justice Alliance, the Newark Environmental Coalition -- Commission, Camden groups, all the related city governments, and not just alerting them, but working with them to aggressively getting out the word. So with that thank you very much, and here's to the next hearing.

MS. CYNTHIA HOLLAND: Thank you. Thomas Jams, Jams Thomas? Going once?

(No response.)

All right. Armando Tamargo?

(No response.)

Vipin Parmar?

(No response.)

Victor Plsar?

(No response.)

Then I'm going to turn to Shahab Kuran (ph) for your remarks. Did he leave? Okay.

Brian Rubio?

(No response.)

Nicole Sitaraman?

(No response.)

Joe Spano?

(No response.)

Ryan Storke?

(No response.)

All right. Jamie Zaccaria for Sierra Club.

MS. JAMIE ZACCARIA: Hello. I'm Jamie Zaccaria, J-A-M-I-E, Z-A-C-C-A-R-I-A, speaking on behalf of New Jersey Sierra Club. And I know you've heard from most of these meetings, so today I'll try to keep

the comments specifically to infrastructure

But I just want to reinforce the fact that we have a bold goal of 100 percent renewable and to get to that goal we're going to have to make bold decisions and bold moves, and we believe that the most important one of those is to put a moratorium on all new natural gas projects, specifically gas-fired power plants.

We have a lot of natural gas already. And I think that we have too much, in fact, and if that wasn't the case, there wouldn't be so many projects proposed that are meant to serve outside of the state. So if we really want to be serious about getting to our goal of 100 percent renewable, we need to be focused on building that and not let natural gas get in the way.

We have five new proposed power plants, especially one in the Meadowlands. We have over seven gas pipelines, and if we focus all our energy on this, we won't be able to actually move forward with the renewable energy goals that Governor Murphy

has committed to.

This also comes with updating the grid, implementing programs for energy efficient technology, distributive generation and microgrids. We need to update the grid so that the next time a storm comes we have stored energy and power outages aren't as necessary.

Even modest amounts of storage can help us get to very high levels of renewable energy, so by updating the grid to increase storage it will help us reach our goals for renewable energy.

And we do think that when it comes to gas lines and whatnot, we do need to do some work for resiliency of placing -- replacing existing (inaudible) for local distribution of gas and oil, older vulnerable electric lines.

One thing we feel that should be focused on is putting these lines underground. We think utility companies are making more money when the lines are not under ground, that this causes power outages, which is bad for the people of New

Jersey, and we hope the BPU can further enforce and encourage those lines to be put underground, where they can be less likely to create a power outage and harm the grid.

We also stress the importance of not putting new infrastructure in flood zones because sea levels are rising and storms are getting worse. We need to use the most up-to-date science to predict which areas they are going to be most at risk for, and be sure that we're not putting any type of energy infrastructure in those areas.

We also must move forward on programs to help residents in commercial properties to receive funding for resiliency projects, for example, property-assessed clean energy, or PACE, legislation. To principal will place a funding mechanism for our homeowners to finance projects such as solar and renewable energy, storm water, and to make their homes more flood resistant. It allows people to use green building techniques, energy efficiency, and can make

communities overall more resilient and sustainable and get low-cost loans to repay their (inaudible) on their property.

We have to make sure that the renewable energy that we're going for is available, feasible to people of all walks of life and all types of communities. This includes community solar and making it so that the renewable energy is in a house-by-house basis that it becomes a major part of our grid and our state as a whole.

And in conclusion, building a more sustainable and resilient infrastructure will not only help to reduce greenhouse gasses, but also improve our economy and create green jobs. We can prevent pollution, reduce greenhouse gases, and to create a more resilient state, but we have to start right now. We must be prepared for the next storm with a stronger grid and energy that isn't toxic and creating more greenhouse gases. That's why we're asking that we take serious efforts to curb the amount of fossil fuel projects approved and

instead focus on clean renewable energy, and that does not include natural gas. Thank you.

MS. CYNTHIA HOLLAND: Thank you.

Mario Giovanni?

(No response.)

Sally Gellert?

(No response.)

Jennifer Fabriano?

(No response.)

Dean Evans?

(No response.)

Christopher Ercoli?

(No response.)

Then I'll call you, Mr. Rawlings, Lyle Rawlings, and then on deck we'll have Evan Berger from CALMAC.

MR. LYLE RAWLINGS: Hello, everyone. And thanks to the Energy Master Plan team for sitting through these interminable stakeholder meetings, and I'm pleased for me, but sorry for you that you have to have two more of those to go.

My name, again, is Lyle Rawlings. I'm the president and CEO of Advanced Solar

Products, and more to the point for today I'm the president and founder of the Mid-Atlantic Solar Energy Industries Association.

MSEIA has been around for 21 years advocating for a solar energy policy, and we have three simple goals for public policy: One, grow solar as much as is practicable; secondly, do so at the least possible cost to ratepayers and delivering the greatest possible public good; and, third, maintain a very diverse market that includes plenty of opportunity for local companies to create local jobs.

Infrastructure is a vital issue to solar energy. Infrastructure affects our businesses every day. And when we look to the future of 50 percent renewable electricity by 2030, which is in law, and 100 percent by 2050, which is executive order form, that is a daunting future. It's a very complex and difficult thing to do. But we're actually affected by infrastructure today.

For instance, and we submitted the

comments for this stakeholder meeting as well as a PowerPoint presentation in which you'll see a map of Atlantic City Electric territory in which circuits are closed to solar or circuits are severely restricted in terms of allowing more solar to be developed.

And if you look at that map, which is available on their website, it looks like a cancer spreading across their entire territory. There's also a close-up of a typical town where the entire town is completely closed to further solar now.

This is an issue which is severely impacting the solar industry and the further development of solar right now. My company, for instance, has several projects under development in Atlantic City territory, and over half of all the projects we are developing have been denied interconnection recently.

Now, part of this is due to antiquated standards, which I helped write all the way back in the year 2000 and 2001, when solar was just a little baby just

getting started in the world. And solar energy was looked at with great suspicion by utility companies. Now it's all over the grid, and we still have those old standards in place that severely restrict the percentage of load in the substation that can be allowed.

We can allow much, much higher percentages of load in the substations, and as a matter of fact another thing holding some projects back is a prohibition against having reverse flow through a substation. Meaning there's more distributed energy on the other side of that substation than there is load, so you're actually back-feeding through a whole substation. Now, utilities don't like that, but we're not going to have a solar energy future if they don't grow to like it.

In California, where they have a little bit more penetration of solar than we do, substations are back-fed all the time. And in Germany, where they're even ahead of California, entire states in Germany produce more solar power than the

total power being used in that state, and they're exporting power from a whole state to France, as an example.

Furthermore, there are technologies available that can aid utilities in connecting more solar into the grid. For instance, every single commercial solar inverter has a capability built into it that's not used. It's called dynamic power factor control, and this can help control voltage on the utility grid. That can help mitigate any problems solar can cause.

For instance, if a cloud comes over and there's a sudden drop in output, we can control how the voltage responds that to that with this inbuilt capability and inverters that's free because it's already there, all we have to do is program it in. Utilities like ACE are not allowing that capability to be used to mitigate the effects of more solar on the grid.

So we have immediate issues like that that are vexing that could be taken care of at extremely low costs, as some of

them are free, as I just mentioned. And if we're going to continue, we're at a stopping point right now at ACE and we're getting there in JCP&L and PSE&G. We can clear those barriers out of the way regulatorily.

Now, onto the long term, and that's where it really gets interesting. Because if we talk about what are the infrastructure needs for renewable energy future, first of all, we've got to figure out what renewable energy are we talking about. Are we talking about wind, are we talking about solar, biomass? How much of that is going to be distributed generation that has to be connected on the distribution system, how much of it is going to be connected directly to the transmission system. Without knowing that we don't know anything about what the infrastructure changes need to be.

Furthermore, we then need to figure out what are the measures to handle the intermittent renewables, solar and wind. Solar and wind are the resources we

have in New Jersey. We've got to look at the magnitude of those resources, but we pretty much know it's solar and wind. Those are intermittent resources, and we all know that poses a problem, and people immediately think batteries to go over those intermittencies. But that's not the only tool in our tool box. There are several other tools we can use to handle the intermittent and handle whatever that mix of renewals is.

And, of course, there's cost. Renewable energy is going to cost more. I see that the PJM person just left, unfortunately, but we do have a cost issue. Renewable energy costs more than fossil fuels. Competitive markets don't cut it because they don't value the cost of pollution. So government has to do it. That's why government has to pick winners. But that cost is substantial, and so in considering the infrastructure changes that we need to plan for, we have to talk in terms of minimizing costs.

You put all of that together, all

of those factors, it's a very, very complex structure that we have to deal with. And the point I'm getting to is that if you make year-by-year decisions, you can easily end up going down a very wrong path and wake up five years later or ten years later and say whoops we built the wrong infrastructure.

So we need a comprehensive full study that takes all of those factors into account and models the system. Now, this is being done. It's done a lot in Germany and it's starting to be done in the U.S.

A brilliant study was just completed for Minnesota for the Department of Commerce called the Minnesota Solar Pathways study. It was done by Clean Power Research and Dr. Mark Perez. We submitted a pre-publication PowerPoint with our comments and used, with permission from Dr. Perez.

But surprises come out. One of the surprises was that we could reach a very low cost, but not really totally reliant on batteries. The first thing that

came out of this study was build more solar than you really need on an annual basis, but curtail it in the middle of the day. It turns out that curtailment is cheaper than building everything you need with batteries. So batteries was a secondary.

Another surprise was that in Minnesota to get to 100 percent renewables by 2050 using just solar and wind, they could get the price down to 5.6 cents per kilowatt hour premium over wholesale by utilizing this mix of many, many different resources, including curtailment. But if they mixed in just 5 percent natural gas, they could get that cost town to 3.6 cents, a dramatic drop in cost for just a small amount of natural gas.

I think I'll probably end it there, since I think we're probably out of time. But with careful study and comprehensive study we can come up with an optimum. New Jersey is not going to be the same as Minnesota. Minnesota has wide-open spaces, and they can build 100-megawatt or 200-megawatt plants. So they're going to

be more on the transmission side

And we're going to be more expensive because it's more expensive to build here and we're going to have more distributed generation than centralized generation. So the results are going to be different for us, but we won't know until we have such a comprehensive study. That will do for now. Thank you.

MS. CYNTHIA HOLLAND: Thank you.

Is Evan Berger here?

(No response.)

Well, thank you everyone for being so diligent about keeping to your time. There is further opportunity for comment, so if you didn't have an opportunity to say everything here, you can please put it in writing and submit by October 12th, and we do have the additional stakeholder meetings.

I'll call through this list, and then I do still have some of your names, those of you who registered today.

Susan Dorward?

(No response.)

Duncan Campbell?

(No response.)

Bruce Burcat?

(No response.)

Clarke Bruno

(No response.)

Okay. Robert DeDomenico? That's you? Okay. And Doug Davis on deck.

MR. ROBERT DeDOMENICO: Good morning, Ms. Holland, and other members of the task force. I brought a little show and tell. I'll explain that later. I'm Robert DeDomenico, D E, capital D-O-M-E-N-I-C-O.

I'm here today because what I have to speak about speaks to resilient infrastructure, energy efficiency, and transportation. And I wanted to speak at all three of those, I only managed two out of three. So that ain't bad, so they say.

Before I get into why I'm here, just to reiterate a little background on me, I've got a little over three years in nuclear power, 25 years in commercial nuclear power, including licensed control

room operation at Salem 1 and 2. Now, I don't speak on behalf of PSE&G. I'm here on behalf of Cargo Fish for which I'm founder.

Prior to commercial experience I was a submarine reactor operator in the Navy. In the U.S. Navy you're an electronics technician when you're a reactor operator.

Now, I joined the Navy because I dropped out of college, so I guess I didn't have focus. But one of the reasons I joined the Navy, honestly, was because I believed that the world isn't as good as it can be unless everybody really contributes their best. I thought the discipline would do me good, and it was the best path I could take from there.

And now for the last eight and a half years -- and that was only a six-year hitch, by the way. I've spent eight and a half years developing what will be the world's next utility. And it's effectively -- you've heard the word de facto teleportation. And I remember I used

that word to get people's attention and I would hear a giggle.

I've given presentations in New York City, Albany, Philadelphia, Long Beach at the International Urban Freight conference, Laval University in Quebec at the first International physical energy conference, where I was invited. They waived the fee so I would come. And the world geographic society and annual conference, I attended that remotely. I've been in many, many competitions.

So more about what this infrastructure is. You've all used de facto teleportation. You've been to the second lane at the pharmacy and at the bank, and you've used a little capsule with a pneumatic shuttle so that you didn't have to get out of your car to go into the building. But we routinely drive a 4,000-pound car to a convenience store to come home with an eight-pound gallon of milk.

Now, let's compare that. The gross weight of the carrying vehicle is

4,000 pounds, the net weight of the payload is eight. I believe we put a lot of tax money into high occupancy vehicle lanes because it's a shame when a car's only got a driver. But a car can carry a couple of thousand pounds and they're routinely being used to carry payloads of a prescription from the drive-through pharmacy or a letter.

I build a utility that instead of using pneumatics it's a small-diameter capillary, if you will, miniature slot car, only it's not a car, it's a truck. And it's self-driving.

By the way, Obama, President Obama, former President Obama, had a goal, a million electric cars in America. How many electric cars did America have before that goal was even stated? Anybody? 900,000. And they were all fully autonomous, and they're still here. They're called elevators. Every elevator in America is a fully automatic electric car, a very successful because it's in a smart road called a shaft.

And this is a horizontal shaft. And this is not the prototype, this is a toy. This is the first case in the world where the toy actually precedes the industry. It's not a model railroad, they followed trains. It's not a model car, they followed cars.

That vehicle only moves six miles an hour, and it goes two miles on a watt hour. Now, an electric car goes about three miles on a kilowatt hour. So which one's really the low-hanging fruit when it comes to what return are you getting on the money you invest. And I know he we need more than one solution, but implore that this solution be given consideration, and I hope finds its way into the draft master plan.

Eight and a half years, this is my own personal moon shot. I've got over 8,000 hours time invested in promotion, acquisition of parts, design, fabrication. I taught myself machining and lathe operation to build. I didn't bring the prototype. It's five and a half times as

big. It carries two gallons of milk, it's containerized parcel. It's going to change the world, and it can start in New Jersey. It's just 4 percent of my gross income since April of 2010. I'm here on vacation again. I do this on my own time and my own dime, and I can't get any backing. I haven't gotten any backing.

Now, I've seen people who beat me in competitions. I bumped into somebody -- I bumped into him ten months after he was one of nine finalists and he got $10,000. He made LED lights, and they were pretty unique. And I was standing in line for Shark Tank, and there was something else going on called the Ratcliff Hatcheries down at Salisbury, Maryland.

So I go to the auditorium when it spills out, and I see a young couple and I say, Hey, what's going on. And she says, well, there's two things, there's this Ratcliff Hatchery and there's Shark Tank. And she starts explaining Shark Tank.

I said, Oh, I know about Shark Tank, I'm here for that. She said, Oh,

what do you do. And I said, I design a new technology so you won't have to drive a 4,000-pound car to go get an 8-pound gallon of milk.

She said, Are you Robert DeDomenico, and started tugging at her fiance's arm, Eric, this is him, this is the guy. Eric Vanderveer (ph). I don't know if I pronounced it correctly. He said, You had the best idea in the competition. I said, You should have been the Judge. I liked them both immediately. And he won another 25,000 that day at the Ratcliff Hatchery.

But except for the people from 22 different countries on 6 continents around the world who helped propel me to 80 percent of all votes of support in an MIT competition -- where the judges turned me down. They said you didn't explain how people would order their stuff. So that's an unsolved problem, so you lose.

So forgive my sarcasm, but I'm trying to say I'm on to something good. There's a lot of stuff behind it that I

haven't shown you. But I solve really all technical problems. And I can move last mile free, which is the most expensive and most critical.

I give to one piece of imperial data. The miners in Chile six years, three months ago were trapped by a cave-in. It took 17 days just to reach them through a five and a quarter in bore, almost a half a mile vertical, and for the next 45 days 33 souls survived because of that connection to the outside world.

Now, when events happen, how many of the underground utilities go totally out of service. They're the first one's back. A utility like this can delivered bottled water, which is clean, it can deliver food, and actually operates on solo energy, the hand crank, it could make these vehicles move.

So I've solved a lot of problems. I've used my background growing up on a farm, built my own bicycles when I was a kid. I built my own slot cars, my own railroad tracks. I've just always loved

transportation. I had a career in energy. I got an idea. I've working on it. I need your help. And I'm so happy that this Energy Master Plan has public hearings. I would have been here in 2011, had I known. And I look forward to seeing at a draft.

I am available for any questions and answers, Cargofish.com. On Linked In I have four articles, a new perspective on free distribution, a network is a bridge to everywhere, and a couple of hours. And I get a lot of good feedback. So anybody -- I include everybody. I'll help you understand what I'm working on. I look forward to delivering it for the good of everybody in the country. And I know that's pretty much in line with your goals, so thank you very much.

MS. CYNTHIA HOLLAND: Thank you.

Doug Davis?

(No response.)

Jim Beddy?

(No response.)

David Steinberg? All right.

And then, Jeanne, you're on deck.

MR. DAVID STEINBERG: Thank you for giving me the opportunity to be able to share a few thoughts and a few ideas I have here. My name is David Steinberg, S-T-E-I-N-B-E-R-G, David Steinberg. I'm here as a citizen, although a member of several non-profit sustainable groups, sustainable Haddon Heights. I'm also a member of the green team, Tri-County Sustainability Alliance, a member of that as well, and the Greater Philadelphia Bicycle Coalition, Camden County chapter. I like trails. And also this has nothing to do with New Jersey, but I'm still part of it and it sparked my interest and part of the reason why I'm here, and that is Spring Garden Eco District over in Philadelphia.

And, by the way, I'm also a nominee for the 2018 Nobel Peace Prize. Really, that's true.

Why I'm here begins with a little story of my son, who at the time was about five years old, and he was registering for Kindergarten over in Haddon Heights, and

through the center of Haddon Heights is a railroad. There's also a bridge over the railroad, infrastructure. And on the way back from registration my wife took him, and he accidentally bumped his knee, bumped his leg, on the rusty bridge, rusty metal and concrete bridge.

Naturally, as a parent, I was very concerned, my wife was very concerned. I mean, you know, those of you who have kids, when a kid skins his knee, he's going to holler. It's concerning, and of course parents have to do something about.

My wife told me about the condition of the bridge. She said that bridge is horrible. I said what do you mean horrible. She said, well, go look at it. So it was only a few blocks away, and I went up and looked at it and, Oh, my God, it was worse than horrible. It probably has not been painted in 30-some years, maybe longer, and there was a lot of rust. It was right across the street from the school that my son had to cross a railroad where they go over the bridge to get that.

As a parent, I was very upset, and I decided -- I figured out, well, what do I do. So I wrote a letter to the mayor, to the school board, and to my congressman who incidentally, his daughter was a classmate of my son's. And they kept on saying that there's problems as far as dealing with the railroad. At that time it was ConRail, probably still is ConRail right now.

So with that I know that the BPU has jurisdiction over the short lines, those are the ones that are only located in New Jersey, and I'll get to that in just a moment as far as that is concerned. But I've got a couple of things I'd like to share with you in connection with that.

Can COLA regulations be made to encourage them to deed over any existing or abandoned local groups advocating building with rails -- with trails or rails to trails, in the case they're abandoned.

The reason why I'm suggesting that is because the single rail line that goes through my town, there were once two rail lines. There's space to build a trail

right away, which hasn't been used in 40 or 50 years anyway.

Okay. In addition in Camden County they're currently working with a railroad and trying to get a trail through town. And in talking with the people that are doing the engineering with the county, et cetera, et cetera, there are a lot of odd shaped parcels that, after the trail is put in there that the railroad owns.

And I explored some of them and it looks like a possibly good location for maybe some community solar fields adjacent to the land that is not used by the trail. So this actually could be another amenity to each community that is a host for them.

Now, the EMP should explore ways to make these defunct areas more productive for the communities that they pass through. If we only look at infrastructure, the plans, the transmission lines, poles, wires, storage facility building, et cetera, et cetera, we're missing a vital piece of energy independence that we advocate.

Let's look at how to integrate these infrastructure improvements into the fabric of our communities, requiring not only green buildings with green roofs, solar energy, but green walls. You know what green walls are? A wall full of plants. You all know that. Net positive structures that use less energy than it creates, and other echo friendly additions that's required for all state departments.

And I know the BPU can't do that, but you're going to come out with an energy plan, and this could be something that could be considered elsewhere at the same time. Let me give you an example.

The CCMUA, which is the Camden County Municipal Utilities Authority, is doing things in the community. They have -- they are under construction or completed approximately 100-plus rain gardens, which will help to mitigate drainage. They're also working with other groups, such as the Center For Environmental Transformation, which is a group in Camden itself, and part of what

they do is they hold seminars. They also have green house, which they raise products, and they're the first ones to raise -- first ones to actually raise and sell products.

They were created in Camden, consumed in Camden. They have kids that come in to help out and they've created little bottles of hot sauce. I tried them, they're delicious. A little hot, but that's what hot sauce is.

So, in addition, I found out about a week ago in talking to one of the county engineers that CCMUA is coming up with some funding to help design a trail through Haddon Heights and Audubon, our adjacent community. This is in part the 32-mile trail going from Ben Franklin Bridge into Atlantic County.

It passes through a lot of sections so this is among the sections that they've chosen. So over the next year or so they'll be working with that, and then they've got to try to get the funding, but at least they'll have the engineering

done. Thank you.

Okay. Regarding any flood plain development, I know talked about were. I didn't know if you have seen it or not, but there is a map put out by Google, which lists the sea rise estimated to be by year 2100. I'd be glad to provide my written notes to you of the link to that. I've used that on several occasions

And taking a look at the Delaware River, the Raritan River, and other places in New Jersey it's eye opening, and it's certainly something that should be considered as far as any infrastructure is concerned.

Okay. Workforce development. Is it possible that any of these infrastructure improvements can also include a requirement for people in low-income communities to be able to participate with that. I don't know if that's possible or not, but I just like to put that out there. It can have a positive economic impact in Camden, Trenton, Newark, Paterson, Jersey City, and a whole bunch

much other towns along the way, and can help not only provide infrastructure improvements, but also economic and social benefits to residents along the way who don't often get opportunities to participate in that.

I'm going to suggest that there may be opportunities that you may be able to work out as far as fee structures for various types of solar. I'm not that familiar with wind, but I'm going to address it just for the solar, where you can have one fee set by the state so the town doesn't say, okay, it's a percentage of the cost, that's the fit, but some reasonable fee for both the utility approval as well as the municipal approval. And it can work out so that any contingencies are met for any -- and anything that goes over that particular time period.

And I'm also going to suggest and recommend that you consider 40 to 45-day period of time from the time that something is submitted for solar approval and the

time it's approved.

And one way to do this is to have a simultaneous approval with both the municipality as well as with the utility. The 45-day period would start on the second submission of the complete documents. Now, if it has to be resubmitted, that's another matter. That can be handled as well. But what this would do is be able to bring things a lot more in control.

About a year and a half ago I was working with a company called Solar City, and approval processes went anywhere from three to six months. And that meant that it's very difficult to tell homeowners that because of other delays beyond the preparation of the things that we at Solar City had done, were able to -- they were -- when really it was other factors. So this is one way maybe simultaneous submissions could cut down the time period and we'll put a time limit on it as well.

There are some other ideas I have. I'll be glad to submit them to your organization as well. And I want to thank

you very much for the opportunity to be able to make a presentation. And, by the way, you can all applaud. I didn't hear any applause today.

MS. CYNTHIA HOLLAND: Thank you so much for your time. Yes, we are still accepting comment through October 12th. Jeanne Fox.

MS. JEANNE FOX: My name is Jeanne Fox, J-E-A-N-N-E, F-O-X, like the animal. So this segment was due -- you had a bunch of questions you asked for every section. And on this one I got to the first question, and I said that's a really good question. That question is what does modern grid look like in 2030 and 2050. And so last night I slept on it.

And, obviously, it's got to be reliable, it's got to be resilient. I participated in the National Academy of Science panel on resiliency in the grid. I think the report came out a year and a half ago, and I told Jim Guiliani about it, so I think the Board is aware of that.

There's a lot of research being

done on this. But also at lease cost, and especially for the BPU, but I suggest all of government, lease cost options for what we need to look at.

And also it has to be customer focused. Where are the customers going, not where are we or the utilities going to force them to go because this is a Democracy and we do have competition.

And, finally, obviously greenhouse gas emissions. They need to be cut down as much as possible, and the goal was by 2050 we were going to have all clean energy, et cetera.

By 2030 climate change is going to really be hitting us hard. We've seen nothing -- that downpour last night, nothing. Because if we stop everything today, 20 years from now it's going -- it's getting worse and worse and worse. So God help your children and grandchildren and us old folks by then, but it's getting really bad.

So you've got climate change getting worse and worse and worse, more

precipitation in the northeast, more flooding in the northeast. We already have like 60 or 70 percent more than we had in the 1960s, unlike the rest of the country that's going to have dry spells continuing, forest fires.

And then also security that I mentioned before. Obviously the bad guys in the world will get worse or get better at what they do. Cyber terrorism, physical terrorism, et cetera, it will happen. It's happening, it's going to happen more. So a combination of those two things really need to drive where we are going for energy future.

I'll try to take the issues basically one by one for what I see for 2030, 2050, and hopefully we can get to some of these places sooner

Nuclear power. Now, our nuclear power plants in New Jersey are -- there are extensions up in the 2040s, '43, '47, I think. So they may be gone for a while, but they might be replaced by other things, who knows. Offshore wind will be coming on

as base-load generation in the next ten years.

And we do need a diversity of renewable energy and technologies and that kind of thing for electricity supply, but I'm certain by 2050 the nuclear power plants in this state will be long gone, at least by five years, maybe longer than that. So clearly we need to have fossil fuel electricity and other energy supplies by 2050 and be well on our way to that by 2030.

Offshore wind, I talked about that briefly before. I think by 2030 we're on our way to it being base-load generation. By 2050 it will be base-load generation. It will be replacing the nuclear power plants in that regard. And there's a lot of reasons for that, but I won't go into that now. I think most of you who are here understand it.

I mentioned before the back bone transmission line. I think that's one of the few infrastructures where there's a major transmission line that will be usable

in the future, in the indefinite future, because we will be growing offshore wind along our coast for the rest of my lifetime certainly, and it will be a major source of electricity, although certainly not the only one because we still need diversity.

But other transmission lines should not happen routinely just because there is a need at this time. You really need to look at alternatives to transmission by non-wired terminus, but really any other transmission line going forward.

First of all, is there a need. Secondly, is there an alternative way to meet that need through the different DERs, different technologies, and that kind of thing, or at least can you defer that. And has everybody has at least told the commissioners, ratepayers pay for that. And what might be a strain of cost, a transmission line might be used for now and the next five to ten years, or maybe in 15, 20 years. It will be strain of cost. And if a utility -- an electric distribution

company owns it, ratepayers will be paying for that strain of cost, not the shareholders.

So I really urge you to have a review of any every transmission line as early as possible to see if there are alternatives to that transmission line. That is much more cost effective, factoring also in a strain of cost possibilities in the future.

I also note in the back bone transmission line, I mentioned it before, I think the power buoys that can happen out with the transmission line. The energy from the ocean can go straight into there. It's just an extra little benefit from offshore, and obviously we don't have siting problems when we have transmission lines up on the line -- on the main line.

Microgrids are huge. Microgrids will be much bigger. I'm suggesting by 2030 we're going to have many municipalities, we're already working on this, and counties will have microgrids for their emergency management, their police

and fire, community center, and that kind of thing.

You're going to have a lot of commercial and industrial campuses as well as -- university and college campuses have microgrids because of climate change, and to some degree, like the defense department, because of security and some of the commercial industrial sites. And I think by 2050 they will clearly be commonplace because of, again, security reasons and also because of climate change and the frequent Sandy storms that will be -- not be 100-year storms, might be 20-year storms, might be 5-year storms. And certainly by 2050 microgrids, I think, will have to be common place.

Also by then, maybe hopefully sooner, using thermal energy storage, geothermal for heating, ice for cooling. It's already been done in a lot of places. I know Stockton, I guess it's University now, has had their heating cooling done for the last 30-plus years by a system like that. It was put in, I think, in the '80s,

but it might have been sooner than that, and it's been quite successful. We haven't done that any place else in the state because there hasn't been an effort.

Hydrogen, certainly a very environmental thing to do, but fuel cells right now use regular gas. You also have hydrogen fuel cells. And clearly why you have some fuel cells that are effective, cost-effective, down to the gas -- hydrogen for them makes sense. Also, hydrogen in transportation -- and we'll talk about water here, certainly would be a safe alternative.

Transit hubs for buses and trains makes a heck of a lot of sense, not just for train transit systems, but also bus hubs, like in Camden and Newark and other places where it's at. Light rail like we have in Trenton and Camden, we need more of them. Obviously like Newark has a small one, but New Brunswick, with that horrible situation with the university. It makes a lot of sense.

Eliminating diesel fuel as soon as

possible. There's a test being done, I think at the first hearing, diesel fuel is just very health -- bad for people's health. It causes all kind of problems with particulate matters. And diesel fuel really needs to be a major issue.

DER will be easily a major topic. And the electric distribution companies need to change how they're operating, how they get funded. I think they'll be using DERs, or should be, for peak shaving as well as for dealing with demand response.

Energy efficiency, DCA and their appliance standards need to start doing energy efficiency. Appliance standards where we have smart appliances so the EDCs can control, not just air-conditioning cycling, but also control smart appliances. I see that by 2030. And we should be working on with -- for appliances.

Building codes. We have it by the '30s, if not sooner. Require that new homes be wired for EVs, not the meters and all that, but behind the meter, so that when somebody wants an EV, they can easily

have that put in.

And also roofs for building new homes and other commercial spaces, the roofs should be built so they can hook up solar PVs if they want to.

We need smart growth, walkable, bikable communities. New York City has one of the lowest use of carbon emissions because everybody takes transit or they walk. We need to do that. We still need to do that. We haven't. There's a huge -- less need for transportation with smart growth.

And, finally, we need to avoid strain of cost as much as possible when we're doing things now. We've got to plan out this Energy Master Plan and have to avoid those strains of cost and factor them into the economics of it.

We have to consider the long-term impacts. So, for instance, the back-bone transmission line makes sense because it should be here for a long time. We have to consider non-wire alternatives for all transmission lines going forward to make

sure that there is, one, a need; and, two, no non-wires trans -- alternative is not available at last cost for that need.

And, finally, we need regulatory reform for the electric distribution companies. They should not be -- obviously we all know this, it should be right in line with what they sell.

Plus, there's people looking at this. I was at the Rocky Mountain Institute EE lab three weeks ago, broke down into groups. A lot of people are thinking about this. But, for instance, maybe you can return on operations so they improve on the infrastructure they already have, not just capital investments. There are people -- smart people in the world, we have to deal with it.

But bottom line, when it comes down to it, it has to be different, it has to be operated differently with two-way communications, et cetera. Climate change ain't stopping, and customers have to do what they want, and they want to be basically on their own. The grid system

will be changing the distribution so that it is really regulating our appliances, our heat, our cooling, et cetera. Thank you.

MS. CYNTHIA HOLLAND: Thank you. So that concludes my list of pre-registered speakers. Is there anyone here that hasn't registered that is still interested in speaking? Going once? Going twice?

(No response.)

All right. So with that then I'll just conclude today's stakeholder hearing. I really want to thank all of you for your participation. This is tremendously helpful to the EMP committee.

I want to thank the EMP committee members and work group committee members that are here today. I want to thank Commissioner Solomon for attending, and for all of you speakers for all of the time and effort you've put into this.

Please remember that we do have two more stakeholder meetings. If did not have the opportunity to say what you wanted to say or you know others, please spread that world and we will endeavor to do so as

well.

And, of course, we are accepting written comments. Please provide your written comments by October 12th. Thank you so much, and have a great afternoon.

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(The proceedings adjourned at 2:53 p.m.)

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C E R T I F I C A T E

STATE OF NEW JERSEY)
) ss.
COUNTY OF BURLINGTON)

I, LAURA P. REAM, a Shorthand (Stenotype) Reporter and Notary Public of the State of New Jersey, do hereby certify that the foregoing hearing, taken at the time and place aforesaid, is a true and correct transcription of said deposition.

I further certify that I am neither counsel for nor related to any party to said action, nor in any way interested in the result of outcome thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this 12th day of October, 2018.

Laura Ream
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LAURA P. REAM

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