BEFORE THE

ILLINOIS COMMERCE COMMISSION

SMART CITIES POLICY SESSION AGENDA

PUBLIC UTILITY

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PRESENT:

BRIEN J. SHEAHAN, Chairman

ANN MCCABE, Commissioner

SHERINA E. MAYE EDWARDS, Commissioner

MIGUEL DEL VALLE, Commissioner

JOHN R. ROSALES, Commissioner

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A G E N D A

PANEL 1

MS. ANASTASIA PALIVOS,
Legal & Policy Advisor to Chairman Sheahan -
Illinois commerce Commission

MR. ANDREW BARBEAU, Senior Clean Energy
Consultant - EDF

MR. DAVE KOLATA, Executive Director -
CUB

MS. ANNE EVENS, CEO -
Elevate Energy

MS. PATTY DURAND, Executive Director -
Smart Grid Consumer Collaborative

MS. JENNIFER MONTAGUE, Director of
Strategy and Technology -
ComEd

PANEL 2

MR. MEL GEHRS - Silver Spring Networks

MS. BRENNA BERMAN, Commissioner and CIO -
Department of Innovation and Technology -
City of Chicago

MR. CHARLES CATLETT, Sr. Computer Scientist -
Argonne National Lab

MS. MICHELLE BLAISE, SR. VP, Technical Services -
ComEd

MR. DAVID SOUTH, Sr. Principal, Sustainability -
West Monroe Partners

MR. MICHAEL ZETO, GM, Executive Director -
AT&T

PANEL 3

MS. ELIZABETH McERLEAN, Legal & Policy Advisor to Chairman Sheahan - ICC

MR. JOE SVACHULA, VP of Engineering & Smart Grid - ComEd

MR. MICHAEL ABBA, Dr., Smart Grid Integration & System Improvement - Ameren

MR. MICHAEL BRITT, VP of Energy Innovation - Southern Company

MR. RUSSEL RAGSDALE, Principal Manager of Grid Modernization - Southern California Edison

MR. BILL ABOLT, VP, Energy, AECOM Technical Corporation

MS. SUSAN SATTER, Public Utilities Counsel - Illinois Attorney General's Office

CHAIRMAN SHEAHAN: Good morning, everyone and welcome to the Illinois Commerce Commission's Policy Session on Smart Cities. This session is convened pursuant to the Open Meetings Act. Our guests and panelists should be aware that a court reporter is present. A transcript of this session will be posted with the Commission's website.

With us are Commissioners del Valle, Edwards, and Rosales. We have a quorum.

I would like to thank today's panelists for the effort they presented in their presentations and for all of you for taking the time out from your busy schedules to attend.

I would also like to offer Anastasia and Elizabeth a special thanks for organizing this today.

Third, technological advances in cities and other public sector organizations have the opportunity to benefit from increased efficiencies created by wireless networking and the Internet.

According to Navigant Research, a

Smart City is the integration of technology into a strategic approach to sustainability, citizen well-being, and economic development.

The smart city concept has developed in response to rapid changes happening in cities around the world. Cities are the focal point for some of the most profound economic, social, and environmental, and technological issues facing the world today.

Now vis-à-vis is the need to move towards cleaner and more efficient energy resources in order to meet the demands of an urban population that will expand by 2.4 billion people over the next 35 years.

Defining characteristics of the smart city concept is the focus on economic development. Cities must be centers of innovation that provide jobs for citizens and attract businesses.

Affordable and reliable energy is one of the most basic features of an economically robust city providing an energy infrastructure to meet the needs of industrial and commercial organizations

while meeting sustainability goals is a growing challenge for cities.

Energy infrastructure is also a critical element of a city's resistance to catastrophic events. Cities represent only 2 percent of global land but are responsible for around 80 percent of the global Gross Domestic Product. They're also responsible for around 70 percent of the world's energy use and roughly the same percentage of greenhouse gas emissions.

Consequently, city leaders are attempting to develop ambitious energy efficiency and carbon reduction programs often partnering with local utilities.

Utilities are helping cities deliver energy efficiency programs through innovation, Smart Grid Technology, demand management, renewable generation, and adoption of electric vehicles.

Energy efficiency initiatives provide a means for cities to roost their operational costs and, thus, protect vital services, such as public safety and education.

Smart energy programs can help improve quality of life by not only making affordable, comfortable homes with lower heating bills a reality but by improving services, such as Smart streetlights while reducing costs.

As the appetite for intuitive, predictive technology rises, governments must adapt to the changing culture and increase smart resources surrounding them.

A few industry predictions speak to the importance of smart cities in the years to come. In 2016, almost $40 billion will be spent on smart city technology. By 2018, according to Gardner, more than 30 percent of local government agencies will use the Internet update to support half of their mission critical programs.

Twenty percent of smart cities worldwide will have key initiatives that address medical healthcare and aging population issues to improve quality of life, and 30 percent of our interaction with technology will be through conversations with smart machines.

To develop an integrated energy strategy, regulators must be forward-looking and aware of the critical issues facing cities and communities as a whole to create into innovative energy policies.

Today's session will feature panels intended to explore the role of the energy consumer in smart cities, discuss strategies for accelerating innovation, specifically the role of industry and academia, and consider the role of utilities in building smart cities and reshaping how fundamental services are delivered and managed.

I hope this session will develop a consensus around the values of smart cities and how industry can utilize information and communications technologies, and deliver innovation to customers, realize cost savings, and optimize operational efficiencies.

Thanks again for being here. I'm going to hand it over to Anastasia who is going to moderate our first panel.

MS. PALIVOS: Thank you, Chairman. And like the

Chairman said, my name is Anastasia Palivos and I'm the moderator for Panel 1. The role of the Energy Consumer in Smart Cities.

The purpose of Panel 1 is to discuss how city leaders and stakeholders target and engage various consumer segments to participate in smart city initiatives. Questions will aim to concern consumer perception and overall awareness of the Smart Grid/Smart Cities Concept, as well as to develop an understanding of the best approach to communicate with citizens the value proposition of smart cities.

The format of the panel will consist of three presentations by each of our panelists followed by a series of questions. If time remains at the end, we will take questions from the audience.

Before we will begin, I would like to introduce our panelists. First, we will hear from Andrew Barbeau, who is a senior clean energy consultant at the Environmental Defense Fund. Next we will hear from Dave Kolata, Executive Director of

the Citizens Utility Board. Following Dave, we will hear from Anne Evens, CEO of Elevate Energy; then we will hear from Patty Durand, Executive Director of the Smart Grid Consumer Collaborative; and last, but not less, we will hear from Jennifer Montague, Director of Strategy and Technology at Commonwealth Edison. Please join me in welcoming our panelists.

(Applause.)

MR. BARBEAU: Thank you very much. My name is Andrew Barbeau, President of Accelerate Group and Senior Clean Energy Consultant to Environmental Defense Fund.

I appreciate the invite to speak today, and as the person going first, I think I had better attempt here to frame a little bit of the history and the challenges and opportunities for the smart cities area for the speakers ahead.

I've worked over the past several years with the growing network of international collaborators on this topic and developed an advancement by creating smart cities, smart city technology, and policy and I hope I can share a

little bit of what I learned on that today.

First, to keep it simple and broad, when we discuss smart cities for this context and I am typically referring to an integration of large scale data and communications technologies with the urban environment, data communications, but we also have to lump data -- we often lump data into a big bucket, so I want to make sure when we talk about data, that we identify whether we are talking about data for planning or data for operations.

Since we turned to planning for growth and investments and adaptation, we try to coordinate data in a way that helps them achieve their long-term policy goals, but this end is different from real-time data that has transacted a need for operations to make cities function and markets grow. That simply is what do you need to know and when.

So a little bit of history, and I apologize the listing is a little bit small, maybe Mark can see that in the front row.

So this is -- the distinction is important to understand where history has come from

and where it's going. So a half decade ago we saw someone threw sheets into a computer modeling, threw traffic flows that are designed for new roads and corridors. But even before that, city planners were using data records in the real world to form infrastructure on them.

The worse roads in the world have been built around paths of humans and animals warrant to the earth as they recorded their preferred routes to make it through, but, more recently, looking back to 1990 since governing of sovereign nations, eventual transactions online, we're making movement toward the government to reduce costs and make managing the city easier on city governments and its people.

About ten years ago we saw the first wave of ambitious smart city projects, major planned pop-up cities, such as Sun Row, Natar, and Qatar, and the United Arab Emirates, that would pop up in a single wave and would be purely designed as an all-encompassing smart city solution that was designed to promote the most sustainable wave

planned and surveilled cities in the world.

For established cities, we saw a movement about six or seven years ago to adopt data platforms. This was based on the simple principle that if we make the data available and accessible, interested citizens and businesses can turn that something into something that is useful to them.

At the same time though, large vendors were looking to add to these assets and proposing to build large communication networks, software systems, and back-end databases and provided to cities with what they found.

Also, in response to that, we saw something else. We saw movement by some cities in droves, if you open the door not just to vendors but to citizen-driven, community-driven initiatives challenging the notion that the environment belongs to city government alone, and we will talk more about that in a minute.

The trend is clear there's a strong drive to vastly increase the amount of data we can collect, the speed at which we collect it, and

figure out the purpose for which it is to be used. How we make available our data for planning operations and for what purpose can have a significant impact on our ability to state our energy goals and ambitions.

(Slide presentation.)

Here is an example of such an effort. This is a planning tool that the City of Amsterdam -- for the City of Amsterdam, and that's how energy is used by buildings, by rooftop solar potential, allows companies to target investments in energy efficiency, district heating and cooling, microgrids, distributed generation.

I use the example in Europe more broadly, because they are now years ahead of where we are in the smart city field. A lot of that has to do with different regulatory environments where states are primarily responsible for energy policies and central programs in the U.S., but it is the cities that are largely responsible for these initiatives throughout Europe and that changed how things operate.

Now European cities reveal part of the reduction of leveraging their investments in the building environs to achieve those in a real way, thus, the smart city movement, which focuses on activities of stakeholders in cities, stand a chance of acquiring there, but we have learned some significant lessons from that.

So how do we learn from those cities and utilities that are starting out as half making mistakes and half successes? Throughout Europe, Asia, and even parts of the United States, we are hearing the same thing.

Number one, cities have failed when they started with technology rather than by identifying the challenges that they seek to address. The French is the same.

Cities have seen years of pitches from the large software and network vendors promising all that can be accomplished if they just lock in their contracts, but how can you make such a large capital investment if you don't even know the full set of issues we are trying to solve? Can I count the

number of pedestrians in real-time on Cicero? Sure. So what.

Cities have viewed this -- Number two, cities have viewed this from a top-down approach how to manage a city. There's a certain temptation to the NOC, the Network Operations Center, of 20 monitors and wide-stream data coming in. You know, this makes sense for emergency management, but are we ever talking about a world in which technicians are very responsive to sudden spiking in CO2.

Shakespeare and Leavitt were generalized in the 42nd Ward at a moment's notice, probably not, but the third point is successful cities have cultivated a bottom-up approach. How do you empower your citizens?

In contrast, these cities have been successful in launching smart city applicants, because they have done so focusing on citizen, innovators, including initiatives, initiatives develop a connected world around them.

The cities ask the question of fuel companies how do they open up the data in the city

grid to enable such a departure of companies to optimize traffic flow or how do they open up the data on electric grids to enable communities to have 20, 30, 40, 50 percent penetration to members.

That flight over Amsterdam that we showed earlier as part of the initiative launched several years ago, Amsterdam smart city, that is such a platform. The focus is on enabling citizens and communities to source, develop, and implement their own ideas for smart mobility using notably microgrids and deploying air quality sensors.

So, as we think about that platform approach and how we can move in that same direction, the first example that I think people will be talking about today is Smart Grid. The core question we are faced with in the Smart Grid is ultimately what could you do if you could measure, manage, and communicate energy use in real time.

Now let's go back to the top-down approach. Some utilities, maybe not only Illinois but around the country, they use Smart Grid as a yearly savings, ability to get outage notifications

using outages from switches, network monitoring, and maybe some new rate design.

But in the bottom-up approach, the focus on the consumer is a little different where adopters use data from year-end structures to launch entirely new industries and smart devices, better implement energy generation, creating new pricing mechanisms to change behaviors into grid roles, even pursuing business models, the Huberization to energy sectors by Dr. Huber at Northwestern where individual users transact energy services between themselves all because he introduced the measuring fold.

Lastly here, the second example is smart streetlights. You will hear a lot today about smart streetlights and microgrids. Again, let's think about the core question here. What could you do if you had a power source, network connection, and real estate every one hundred feet in the urban environment?

That top-down approach you will hear today may discuss the opportunity to dim the lights from afar, capture energy-efficiency savings, and

maybe hot-wire sensors and take the grid information back to your 20 screens and your proprietary databases, but the true value here is the network.

What if rather than simply installing these lights as is, those lights include something as simple as a USB hub powering data, allowing any third party to plug into the device and paying a small fee for bandwidth usage.

Think of it as an app store for the real world. What type of research, what type of innovation, what type of business model, what type of revenue could come from that? That's it.

MS. PALIVOS: Thank you, Andrew.

Chairman, Commissioners, do you have any follow-up questions for Andrew before we move on?

(No response.)

Dave.

MR. KOLATA: Thank you, Mr. Chairman, Commissioners. My name is David Kolata. I'm the Executive Director of the Citizens Utility Board. It's great to be here and I appreciate the invite.

At CUB, we are generally supportive of Smart Grid and think that Smart City Technology, if designed properly within the consumer center, has great potential for cities, and the state, and the country.

If I had to put in one sentence why it is we are generally supportive of Smart Grid is that our job is to make sure that the rates are as low as they can be reasonably going forward, and we think that distributed energy resources are key for that least cost vision.

There are very promising trends with technology, with declining costs of solar, and battery advances, and improving automation systems, so we're on the presses and there are a lot of big gains when it comes to energy efficiency and efficiency demand response.

If we set the system up well, we would argue, I think we can argue quite well, in fact, that the Smart Grid is necessary if not sufficient conditioned for maximizing the data entry resources.

So that's where our world view is

coming from. It is the least cost world view. I need to think that looking forward that energy efficiencies are the key for that, but that's not going to happen automatically. It's not put in infrastructure networks.

Smart Grid doesn't mean that the value is going to be maximized or these things are going to turn out to be the least cost feature. There is a risk here that you get the bill without the benefits, so this is why we keep coming back to making sure that the investments that we are making that all of the value is maximized.

What does it mean when I'm talking about -- when I say "maximized," I'm talking about a lot of things in the bottom-up approach there. Can you set up the network so that data moves seamlessly and quickly to third parties so we can have innovation?

We need to enable technologies, like Community Solar, TOU Pricing, all these things that we are going to give consumers in the system an opportunity to save, and I think that really that

will be the key to the education component of this and answer questions that you would like us to address around consumer education.

I think the key to that is giving something that consumers can do. No one is going to care about Smart Grids or smart cities in the abstract, but they will care about functionalities and that enables them to do things that they really want to do, be it peak-time rebates or real-time pricing, community solar, that's the key, and that's why we are going to keep pushing to make sure that the value of these grids are fully developed, because no one will care in the abstract, and I do think in Illinois consumer education is an on-going process. I think it's going better than as -- I think there's still a long ways to go.

I believe we have avoided a lot of pitfalls that have occurred in other states, but it's still a work in progress, and I think that Anne and Pat will have slides to that effect. There is still a lot to do in this arena, and I think it really comes down to making sure that we don't miss

an opportunity to do something.

I do think that utilities will play a key and important role in all of this. When we're talking about distributed energy resources, it is distributed in terms of what gets back to the distribution grid and making sure that the value is optimized and will require that we determine what is a proper monopoly function, what is a competitive function, and then for the vast majority of services that I think at the end of the day are probably some combination of how does the pricing work, how does -- who gets what, how does the flow of revenue move.

I think those are all utility-in-the-future questions at the end of day and that's why we do think it's important to move forward for the process on that, because there are no easy answers, but those are very interesting questions there, and when you start thinking through smart streetlights, which we are very much supportive of, you know, one question is where does the revenue come from and the possible answer to that is energy markets where infrastructure trust

advances some of the money, but an equally important question is where does the money go and who gets it, who's taking what risk, and because the utilities are going to be involved in that, obviously, we are going to be dealing with consumer money at the end of the day.

So figuring out deregulatory landscape problems and those types of questions I think will be absolutely crucial, and we look forward to participating in that process. Ultimately, I think we do need a coherent regulatory framework and performance that -- an incentive structure that it can encourage innovation around these cost options and technology that will require a rethinking to a certain extent of our current regulatory framework I believe.

There are a lot of complicated and important questions, but certainly we are committed to try and move forward. Our sense is that there's an increasing group of folks in Illinois who are interested in doing the same.

Just a final word here on smart

cities. I know Andrew mentioned Opticon, which may or may not be a good metaphor, but it is a good metaphor for my final words here, because I think it's very important as we think this through to put the consumer in the private sphere at the center of all smart city system architecture and design.

If you think about smart cities in the broadest possible senses, it's basically sensors combined with big data machine learning which obviously can raise privacy concerns.

I think that we handle those well on when we're dealing with elective data, which is good and important and an absolutely necessary thing to do. But when you start thinking through other types of data, relocation data, or health data, or voice, there's, you know, some very disturbing privacy implications that I think we are going to need to address as we -- on a case-by-case basis as we move forward on this.

I think the current debate with Apple and the FBI on encryption technology is just sort of a precursor of that. I think it's just something

that again may not have an easy answer, but we are going to have to work through that.

We certainly don't want to end up in an actual Opticon. That's not really in the consumer or citizen's interest, and then also security. This is the market texture.

Right now I think that that's, to some extent, it seems like taken for granted by a lot of manufacturers. I know that there's some stories recently about a search engine called Shodan where you can basically search engine for Internet things, and they used it, and pretty easy to find out that not everyone has secured their baby monitors, and so there was a whole series of stories about, well, people basically, even hacking, just getting photos from inside your home, because you hadn't secured your baby monitor. Is that the fault of the consumer?

I would say no at the end of the day, because ultimately we have to make sure that the architecture is easy, and people understand, and that it's automatically secured so you don't get

into these situations.

So I think, as we think through Smart cities, we think there is a lot of potential. We just want to make sure the consumers are centered, and I do believe that privacy and security issues will have to be addressed in a way that gives the public confidence to move forward. Thank you.

MS. PALIVOS. Thank you, David.

Chairman Commissioner, do you have any questions for Dave?

COMMISSIONER ROSALES: Sure, I do.

Good morning, Dave.

MR. KOLATA: Good morning.

COMMISSIONER ROSALES: In your public comments there seems to be some trepidation in the rollout of a number of smart grids.

What would be your -- and it may or may not be correct -- what's your time line in how this would be rolled out.

MR. KOLATA: You're talking about the smart grid as far as electric, or smart cities, or broader?

COMMISSIONER ROSALES: The broader.

MR. KOLATA: I don't think that I have trepidation per se. I just want to raise that I do think that the privacy and security issues are very important, and I think that this sort of gets to what Andrew was saying at the beginning about a top-down-kind-of-technological-risk approach.

We are very much intrigued and we think there's a lot of possibilities from smart city technology. We just want to make sure that it's implemented correctly and appropriately, because we don't want to see a situation where, in effect, consumer privacy and the privacy is eroded over time.

When we think through, it can be sensed. There is a lot that can be sensed, and, in fact, if you searched automatically, there is a lot that could be sensed, and the fact if you searched automatically, there's a lot of things that can be done, so I just wanted to basically raise it, but I think that from a regulatory point of view, and this -- you know, we include the Illinois Commerce Commission, but probably others, too, depending on

technology -- I think it's going to be important to have a framework that really makes sure that security and privacy are integral to the whole system's architecture.

MS. PALIVOS: Thank you, Commissioners Rosales.

Now we are moving on to Anne.

MS. EVENS: I'm Anne Evens, CEO of Elevate Energy. I want to thank the Chairman and the Commissioners for hosting this panel today and for the opportunity to speak and also Anastasia and Elizabeth your help in affording us this great opportunity.

So at Elevate, our mission is to smart energy use for all. We design and implement energy efficiency advertising programs and energy assistance and educational programs across the state, and we are talking to families and consumers every day about what they think and what they care about, and I'm going to talk sort of on some bigger things, because I got a peek at Patty's presentation and she has a lot of great data. So just to sort of start out with I think that we made some successes,

as Dave said, on the education front.

I think there's an increasing awareness that there are Smart meters out there, and I think I would agree we've had a lot more success in Illinois than in any other state, but I think -- well, it's nice to kind of pat ourselves on the back a little bit.

I think the challenge that we face truly communicating and educating consumers on the opportunities that the Smart Grid and, in particular, smart cities is huge and, you know, when I think about the last 30 years that I have been working on city and community development and energy issues, you know, there's been a lot of -- over decades we kind of delivered energy in the same way more or less, and over the last ten years or so or maybe even a little longer, the environment changed.

I think things are changing very quickly, and I don't think we can underestimate how much education is needed to get us to a place where customers are really benefitting.

So I think in terms of trying to answer the question what does this Smart Grid or what does smart cities mean to customers at this point, I think at this point it really is very little and I think that we -- until we can very, very clearly communicate how families can benefit in terms of reduced bills and how their communities can benefit in terms of improved infrastructure, we can't really hope to fully engage people and make sure that the benefits are reaching everybody.

So I think while we made a lot of progress and there's a lot of opportunities, we are going to have to really work very closely together to make sure that we are successful.

I think it's really incumbent on all of us to work together and figure out how we can really demonstrate that value proposition for customers, and, you know, clearly customers are very interested in saving money, and I know Patty will give a lot more clear data on that.

Clearly customers are interested in getting information, but I think it has to be actual

information, information that drives change so that by shifting consumption off peak, you save money, and I think we are going to have to work very carefully to make sure that we are providing the right level of data to everybody so that everybody can benefit and then clearly there are environmental benefits.

I think as we look at the challenge that the city faces in terms of older infrastructure and the need to make investments in the city's infrastructure, as well as the utility's investment in the Smart Grid and in smart cities, if we could really align those and get everyone moving forward towards the same set of goals, we could make huge strides that benefit customers as well as the city and the utilities.

So to talk a little bit about how customers are engaging now and the picture on the slide there is an in-home display called ORB. Our customers have been working on our pricing programs for decades, really love these kinds of simple technologies that encourage people to shift.

Consumption off peak, but there's a lot of other technologies out there as well and I think we have seen the benefit of ComEd's Hourly Pricing Program, Time Savings Program, as well as Ameren's Power Smart Pricing Program, Peak-Time Rewards Program.

So those programs are really promising and they're actually delivering savings. They're reducing bills as compared with a fixed price rate to customers across the state, and I think we have a real opportunity, too, with new options, including time-reduced rates, to really expand on the better off-rates that are out there for customers that deliver actual savings that are concretely tied to the smart grid, so I think there's huge opportunities on that front as well.

And then, finally, I just wanted to kind of summarize and let customers speak for themselves. You know, we have -- when you think about Illinois or even across the City of Chicago, we have a huge diversity of customers and customer needs, so, you know, we have folks that

own the electric vehicles and they can charge at night at a very low cost, of course, are very happy and engage with the Smart Grid, but we also have low-income families with kids who take advantage of hourly-pricing programs and efficiency programs to both conserve and significantly reduce their bills.

There's a lot that we can do to help customers control their energy costs over time, and then I think with the Peak-Time Reward Program we have very simple, simple ways, very safe ways to get customers engaged, and we can get more and more customers on these programs.

You know, one of our customers said it's kind of a no-brainer. Everyone should be on this program, and they're seeing savings immediately, so I think this has been proven to be a good way to engage with customers.

I still say that most families don't yet understand how they can consume energy in their homes, how much gas they consume, and how much electricity they consume, and how their own behavior and choices can influence that, so, again, there's a

huge need for education.

Finally, in terms of what we need to do to remain forward, I think we really need to have a comprehensive approach. I think the energy landscape in Illinois is confusing.

There's a lot of different -- a lot of different messages going out with regard to Smart Grid, with regard to efficiency, with regard to different providers, and I think we need to come up with a way so that when we are engaged with families, we can give them a sort of independent-trusted, community-based set of information and recommendations that helps them access everything as opposed to I think what we have right now, which we have a lot of different messages going out and a lot of confusion which doesn't -- it limits the accessibility of all of the offerings that are out there.

I think we need technologies, technology is -- and I know we are going to be talking about a lot of technology. Technology has a lot to offer consumers, but I think as we offer

technology, we need to make sure that we are offering technologies that's successful to everyone.

So I think now is the time to start demonstrating to customers that there is real value and there's real value to everyone, so if we can demonstrate that through community solar pilots that improve the accessibility of distributed generation to a larger number of customers and we can accelerate some of these demonstrations, I think we'll see a much more engaged consumer as well as we'll be able to deliver real benefits to consumers, So thank you.

MS. PALIVOS: Chairman Sheahan, Commissioners, do you have any follow-up questions at this point?

CHAIRMAN SHEAHAN: Yes. And help us think about some ideas that kind of got raised at the housing policy session and today.

I'm struggling a little bit with -- we had a data point at the last session that showed that low-income households, relatively speaking, use more energy; is that right?

MS. EVENS: Yes.

CHAIRMAN SHEAHAN: And so I think, you know, you are saying that this is way down on peoples' radar. There's kind of a lack of sophistication generally. Low-income houses use relatively more electricity, but it's not -- it's not a big concern for them or people generally.

So how do you get low-income housing -- you know, low-income households that are already struggling with sort of sophistication to be engaged in this?

You mentioned real-time pricing, but that's something that a sophisticated person could take advantage of to reduce their bill, but someone who's not really paying attention doesn't really understand, could actually end up paying more, couldn't they, if they use relatively more to begin with, they're relatively less sophisticated than others? Are there pitfalls to that?

MS. EVENS: Well, I would say -- just respond to where you started, I would say that low-income customers are concerned about energy costs, and they're concerned about utility costs, and they're

very aware of how important utility costs are towards their -- with regard to their visibility of their housing.

What I meant to say, and I apologize if I wasn't clear. What I meant to say is I think that a lot of people still don't understand how they use energy in their homes, so they may not, for example, know that their heat and domestic hot water is likely to be related to their -- how they use -- how they heat their homes, and how they heat their hot water is related to their gas bill and they may not understand how their actions and use of appliances are related to their electric bills, because we haven't done that level of education yet.

We have made a lot of successes, a lot of progress, but there's still a lot more work to do, and I think that, you know, energy consumption in the low-income households is very diverse, as diverse as it is in other sectors, and you will see some low-income customers who probably could do very well on hourly pricing and some that may not do as well.

I think the way you get at that is because the data is now available and you can take a look at peoples' consumption patterns and load, I think you can target the right kind of program that will result in benefits to the right kind of household, and I think that's where we are.

We have a lot of opportunities and I think we should challenge ourselves to come up with the right set of programs for the right demographics, and this speaks I think a little to what Andrew was talked about with regard to bottom-up strategies and the need to develop strategies that are -- that are community-based and that meet the needs of the particular communities that they're targeted towards.

CHAIRMAN SHEAHAN: Thank you.

MS. PALIVOS. Patty.

MS. DURAND: All right. So I am excited to be here. I'm excited actually that this Commission is having inquiry into smart cities, because Illinois has shown such leadership in their smart grid initiative and infrastructure, electricity

infrastructure legislation, and among the states across the U. S. that we're constantly looking at, I'd say Illinois is at least in the top five, if not in the top three.

So the fact that you are having this workshop today and having speakers in from across the U. S. to share what they know really speaks highly to what the future goals for this state is for smart cities, so we're all watching.

So the Smart Grid Consumer Collaborative is a non-profit, and our focus is to research consumers around what they know, what they want, and who's out there when it comes to energy and technology.

I'd like to share with you a little bit today about what we know. This data that I'll be sharing with you comes from this research. It's our annual Consumer Pulse and Market Segmentation Study. It is a benchmark study that we do every year. We are a six-year old non-profit and you are seeing that's Wave 5, so this is our fifth wave of asking consumers questions and studying consumer

preference and interests.

I'll start with the question that many of the panelists have already addressed, and that is "What do consumers know?" And the main question that we do ask them when we begin the survey is "Have you ever heard of the term 'smart meter?' Have you ever heard of the term Smart Grid? And, of course, for the focus of today, have you ever heard of the term smart city.

We haven't asked them that, but I think it's clear from this data that the answer would be similar in that most have never heard of the term.

So draw your attention to the bottom bar, the bottom bar, the largest answer is "I have never heard of those terms," and the different colors, the lighter orange is Wave 1, the very first time we asked that question in 2010. And Wave 5, when we asked that question in 2015, you'll see barely has budged. So in the past five years, most consumers haven't heard of either term. That's in the 50s.

And if you look one above, "I have heard of that term but don't know what it means," that's in the low 20s. If you add the 50s and 20s together, now you are in the 70 percent of people across the U. S. who have either never heard of the term or heard the term and don't know what it means.

And then the third one from the bottom is "I have heard of the term and have a basic understanding," and then the tiny bar, the smallest on the top is, "I have a complete understanding of what is a smart grid and what is a smart meter."

So less than 10 percent have heard of those terms, so we know by data that most people haven't heard those terms, but that may or may not matter, because many utilities aren't using those terms. There are a lot of infrastructure improvements that don't -- that customers don't see firsthand, so a lot of our survey work also asks other questions around the benefits of the smart grid without asking head-on have you heard of those terms.

So we asked consumers questions like

"Is your utility doing a better job of reaching out to you? Do you have access to your data and information on-line? Is your restoration rate -- do you perceive a better restoration time from your utilities or your utilities became better to use? Do you have more pricing plan options and other programs, things that a smart grid -- benefits that a smart grid provides, even if they don't know those terms," but for this purpose of the smart city, smart meter, smart grid, most people don't know.

And then for those who do know, that smaller group, that third from the top, that's really at the top that says they know what it means, we asked them "Is it a good thing? Are you favorable towards your state implementing these technologies?" And most people are.

For those who have heard of it, we will see, you can take very favorable and somewhat favorable. You are almost at 50 percent, and then people who are neutral, like they don't have an opinion either way, were in the 70 percent.

The number that varies -- that are

unfavorable is that smallest bottom bar, and you'll see a little up to here -- I'm pointing to with my pointer -- that shows the unfavorables have tipped up a little bit in the past five years. I'd say a little bit is typically significant. It is by no means the majority, but this is like up to the end of the unfavorables.

And while we don't have all the reasons, there are some smart meter groups who have made traction in mis-spreading this information frankly without the effects of the smart meter, who are the happier in the smart meters since there are no negative home studies, and no smart meter has ever been hacked ever that I'm aware of. It shows Chase changing, but utilities have data that has not been hacked and has never been hacked, not to say that it never will, but its track record is extremely good.

So who's out there and what do they want? What do we know about people? We have divided the U.S. population into broad categories of values around energy and technology as this pie

chart shows. We call them "segments." It's basically a segmentation framework, and I'll share with you just a little bit more about this.

And although this is a national study, certainly every state and every territory in the U. S. has these groups. The percentages might be slightly different in Illinois than maybe in California, maybe in the Southeast, but every one of these buckets of attitudes and value is represented in every part of the U.S.

So first off, the largest one you will see in the pie chart that's 30 percent are green champions. These are your traditional environmentalists. These are telling -- these people are telling us that they are very interested in smart energy technology. They appreciate having access to data. They appreciate being able to get text alerts from their utilities. They like having program choices. They're concerned about greenhouse gas emissions and climate change, and in terms of demographics, this group is higher educated, higher income, and are working and traditionally live in

suburban households.

The next biggest group are saving seekers, and this group is middle income, average education, tend to live in single-family households and also are very interested in pricing programs, very interested in energy efficiency programs, and would be very interested in anything having to do with smart city benefits or smart grid benefits that they see accrue the bottom line.

So this group, the green champions, and this group, the saver seekers, are very likely to enroll in pricing programs, demand response, peak rebates, those types of programs that either save them money or they perceive as saving or helping the environment by removing energy waste or reducing greenhouse gas emissions from their footprint.

This group is -- this is the group I think receives the predominant amount of attention or at least in the electric industry. This is the status quo group. These are the people that are telling us they're not interested in the Smart Grid. They don't perceive there is an issue with

electricity. They're not going to enroll and not going -- they don't read the bill stuffers that the utilities send them. They don't really care.

In fact, what we encourage for those of you who might be thinking of programs and messaging just to leave this group alone. They're the minority.

I'll go back to the pie chart. You see the status quo group represents 18 percent of the U.S. population, but oftentimes when I speak at utility industry conferences or speak on webinars, I get a lot of questions around or push back don't people really care. Don't they just want to flip the switch and have the lights come on? You might hear that around smart cities. Do people really care? Don't they just want the city to run? You're the government. As a matter of fact, don't bother me. I'm busy. That attitude is out there. It's a minority position. Most people do care.

The technology-cautious and this group also tends to be a more retired middle-income group. The technology-cautious also tend to be more retired

middle income, maybe more low income, and they're not going to be quick to embrace new technology or any kind of information that has to do with them doing a lot, unless they can really see the bottom line. So they're not exactly saving seekers and they're not exactly green champions. They're more skeptical. They are not as oppositional as the status quo group is, but they're not an easy group. They're not low-hanging fruit. That's why we call them cautious. With the right education and the right outreach, they would be very interested in what a city is doing or what a utility is doing around technology.

And then the last are movers and shakers. This group is very interested in technology. They're what you might call "earlier adopters," except for a bigger group than early adopters. They tend to be high-income. They tend to be high information, high education, and they are the ones, if there's any dissatisfaction with their utilities, these are the ones that would like to be told, because the utility isn't offering them the

technologies they want.

So they're the ones that are poking around at Best Buy, and Home Depot, and Lowes looking at the home energy management systems that those places offer. These are the ones utilizing -- looking at Comcast, and Google, Pfizer, and NEST, and these are the ones that particularly want to engage in, and adopt, and embrace for any kind of city programs or city planning when it comes to smart cities or for utilities for the Smart Grid.

So just to recap, the U. S. population by segment, two of those segments, the status quo and the technology-cautious, pretty much aren't interested in what we are gathered in this room here today to discuss, but the other three are. They would be very interested in knowing how your city, how any city, the cities they live in, is advancing and adopting technology to make their lives better, to improve their living quality.

And then we also asked a lot -- besides e-mail and what their attitudes and values are, we asked them just questions about their

technology, adoption, and interests.

So you'll see here these bottom darker bars -- and, again, it's a comparison between different waves and different years -- is "What is your interest in technology?" So for smart appliances here, the darker bar means they have already purchased a smart appliance, meaning communicating device like a washer, dryer, and that's not a NEST, but an appliance, then the lighter bar is their level of interest.

So you can see while current adoption is very low, interest is very high in all of these technologies, so we have the hybrid electric or plug-in or electric hybrid vehicles cash and carry low 10 percent. Their interest is pretty high, and then programmable, communicating thermostat, adoption is quite a bit higher on that.

We have all heard about the NEST you can control with your phone and turn up the heat and cooling system when you are on vacation and coming back, and you'll see not only is adoption already higher in the 20s, but you can see that interest is

yet still higher.

Most people want one of those, even if you don't have it yet, and then home energy management systems adoption is quite low at one percent, but it's ready to explode.

People really are interested in technology and PV systems we didn't ask that question in the past year previously and we are starting to ask it. Again, while adoption is 2 percent, interest in the PV system is very, very high.

So I think this goes quite strongly to put it on smart cities. People are more comfortable with technology now than even in the past five years when we first started studying this. This piece of research doesn't show it. I believe we have another piece that we studied and released in February that shows a much greater answer to the question "I was the first in my family to adopt new technology."

When we started asking that question in 2010, only 19 percent of the U. S. population said, "Yes, I'm the first person," the typical early

adopters, and now when we ask that question, over 30 percent of the U. S. population says yes to that question, which was a huge jump in five years.

While we don't have causation, we think it's because of the Apple phone having its iterative iPhone 4, iPhone 4 S Series, iPhone 5, 6, Samsung Galaxy. The iterative process of improving technology has made the general population much more comfortable around technology and is much more interested in its iterative process.

In terms of consumer value proposition, we've done a lot of studies around what is it that baffles the consumers to get out of smart grid and technology and innovation. So I don't have time to get into it this morning, but there are three broad buckets or categories that we are confronted with, about a third of the benefits being environmental with scale and renewable which is reducing greenhouse gas emission, reducing your footprints, building energy efficiency into the grid through a lot of technologies that aren't consumer-based like volt-bar and -- I forget the

last one, lots of them -- as far as management needed sensors on the grid, and things like that, and then economics which would be the bill facing the customers and downward pressure on rates and then reliability, improving the -- improving outage management, the effects of outage management.

We have a whole project on consumer value proposition around how to message to consumers because you are not going to go in front of consumers and talk about volt-bar or global initiatives, or any of those things, but there is a certain way of communication. Professionals are helping us write messaging on how consumers benefit from a Smart Grid in ways that they want to know about and appreciate and the same would be true for smart cities.

And so I'll just close with these top five lists of how citizens are best engaged around Smart cities and smarter grid. So, as Andrew started out by talking about this morning citizens are the priority stakeholders, and when we talk about bottom-up and top-down, it's really all about

how the city's -- how is a citizen's life improved through smarter cities.

So you are not going to talk about the fact that streetlights can be controlled remotely. You are going to talk about ways that citizens spend by not being on dark streets because sensors will know someone is there and light up the street, and the consumer value proposition is critical doing a study around what is the citizens getting out of it and how to message that citizen in ways that they care about, not ways that we care about, and then consumers want technology.

We have a lot of data around that, even if I only have a few minutes to share with you this morning, we have a lot of solid data, and I think we can all see just how ubiquitous the Smart phone operate.

Consumers know very little about the smart grid or smart cities. They just haven't heard those terms.

So there's an education lift that we as stakeholders have to have to make sure consumers

are put into this and engaged with this, and we have a whole other body of knowledge on how to handle citizen engagement around topics that they're unfamiliar with.

So with that, I'll close and thank you very much for your attention.

MS. PALIVOS: Thank you. We will move to Jennifer.

COMMISSIONER MAYE EDWARDS: May I ask a question.

MS. PALIVOS: Sure, you can.

COMMISSIONER MAYE EDWARDS: Thank you, Patty. I always find your facts and figures stimulating. I'm itching t ask many questions, but actually I'm just going to wait until after Jennifer's presentation, because I think she brings a very good perspective, but I did want to ask generally I think that, you know, the way that you have your -- I guess your pieces split, you know, among technology -- technologically maybe challenge or status quo, I think those are interesting but something that comes to mind is generational split.

You know, I very recently asked are

utilities' further breakdown of their consumers based on generation and hoping not that soon.

With that, do you think that it's important to look at it from that perspective to look at it from a perspective of not necessarily, you know, these people are status quo? They're fine right now, but actually in generations, if that's true, what is driving a lot of this change.

MS. DURAND: Yes. That's a good question. We discourage looking at consumers through demographic lens, because what we found in our work is that people care about the environment. We're not -- despite their age or income, people care about energy or not independent of their age or income.

So just because someone is elderly doesn't mean they're not interested in technology, and we did a study on a digital divide expecting the results to be a little too mime with what you said that the elderly are much less technologically embracing, and while that's true to some extent, they're also technologically divided among income, but low-income people, while they don't have wi-fi

and they're not always at home, they do have Smart phones. They can access the Internet through their Smart phones, and the elderly embrace technology much more along educational lines than just age lines.

So, for example, my in-laws are in their 80s and they're texting and have every device imaginable from laptops, to iPads, to Smart phones, and my parents are the opposite. They don't have any of that. They only handwrite letters.

So I think it's the educational lift we need to tackle the unique situation of a low-income person and the senior, but then everyone is -- everyone has their own attitudes and values around energy and technology, and so we'll have to approach them all rather uniquely or just have a big educational lift for everyone at the same time.

So I think there is a difference between the elderly, but it's not so broad that they're still not represented in those categories. They definitely care about the environment and not necessarily care about technology regardless of

their age.

COMMISSIONER MAYE EDWARDS: Thank you. I'll wait for any remaining questions until after.

COMMISSIONER ROSALES: One final question. Thank you and we appreciate it. It's fascinating, your presentation. Who names the buckets?

MS. DURAND: We named them. They changed last year. There was a segmentation framework came in 2011 and we refreshed the data last year, so we just updated like the technology last year. You know, there's a committee that looks at all the data and tally how they break through that.

COMMISSIONER ROSALES: National committee?

MS. DURAND: It's a national committee, yes.

COMMISSIONER ROSALES: My history years ago was analyzing data for focus groups, so do you go -- following up with Commissioner Maye, do you go -- although it's not generational, do you go to buckets or do you go to sub-buckets, because is it too much in the weeds?

MS. DURAND: We have a 95 percent confidence level. We have used professional survey firms to do

work for us and then we can break the data down by demographics.

So, Commissioner Edwards, if you want it, we have it. We will just give you the elevated across all the buckets though. There are sub-buckets but we just -- we haven't got into those weeds, but they do exist.

COMMISSIONER ROSALES: I wasn't talking more generational, which is in sub-buckets themselves, because at times they're not very rigid.

MS. DURAND: Granule?

COMMISSIONER ROSALES: It's not really rigid. It's actually the gray area between the two.

MS. DURAND: There's some overlap. Not everyone gets -- there can be an environmentalists that wants to save a lot of money, but there's definitely a way to draw it down into the data.

COMMISSIONER MAYE EDWARDS: I would be interested to see how race plays into the survey as well, if you have that understanding.

MS. DURAND: Okay. I will look into that and get something to you.

MS. MONTAGUE: Okay. First off, I would like to thank the Commissioners -- the Chairman and all the Commissioners for inviting us to speak on the role of energy consumption.

My name is Jennifer Montague and I'm with ComEd, and I'm going to share with you today a bit about the community of the future and how we think about customers.

At ComEd, we define community of the future as really as between ComEd and the local community. That includes customers, and stakeholders, and that community --

CHAIRMAN SHEAHAN: Jennifer, could you just pull the microphone up a little closer.

MS. MONTAGUE: Is that better?

CHAIRMAN SHEAHAN: That's perfect.

MS. MONTAGUE: Thanks.

So the community of the future is going to be connected and customized for that particular community and will also be livable and sustainable long-term.

Now the overall goal for us is really

to make sure that we're leveraging smart grid, and any smart meter can use technology. It says we can make peoples' lives more affordable and improve their lives everyday and that will ultimately have residents and businesses connected to each other in new ways, so those new ways can range from community solar or demand response.

Customers will also have more control over their energy use and get more options, whether new on-line tools or for potentially energy trading portals, to help them manage and use their energy data.

You will also be able to use more energy and ultimately reduce their carbon footprint through hybrid vehicles, charging stations, and the community really will find new value and save money through things like peak-time savings. We talked a little bit about that.

Customers will be able to go places using items such as smart apps, USB charging stations. Customers will also be able to increase their level of comfort in their neighborhoods, their

wi-fi access or community congregational through microgrid.

Customers will be able to see and feel some of those tangible improvements in their communities and those can range from things like gunshot detector to streetlights -- on streetlight to solar gardens, cleaning up their vacant lots, to conduct walk-in services.

And, lastly, customers will benefit from seeing investments in their future as we train, and hire, and educate in the community.

Now this vision is going to take awhile, and it will be gradual, and it will be a collaborative of community leaders, organizations, and stakeholders.

Now this slide really talks about throughout the entire process we want to be at the forefront of engaging customers and really making the best customer experience possible when we think about smart grid and engage in smart cities, but in order to do that, we really need to evaluate what customers actually need, so that's sort of what

they're trying to do, and then -- also then we need to access what's the current reality for customers where they are and in the future for customers where you want them to be.

Now Patty and Anne both sort of talked about how to incorporate new customers, and Patty talked a little bit about stakeholder engagement. We haven't necessarily done stakeholder engagements here, but we are sort of thinking about where customers are and where we want them to be.

So for customers who want to save time and money right now they may be saying, look, my bills are too high and my house is older than me, so I really can't save money. I just don't get it. I don't understand how to control my energy, and we want customers in the future to be thinking a little differently.

We want them to be able to say, look, I use some on-line tools and that helps me manage my usage of energy and now my bills are much more manageable or we want them to say my energy efficient upgrade investment in my house is saving

me money.

The second one there is a customer who may be attempting to move to the city or go places, right now they might say, look, I have got to take a bus, and potentially with data from the mesh network a future customer could say I've got really useful information to help me and my family find a bus.

Customers who are trying to, you know, be comfortable in their house and make sure they optimize their comfort for their families, right now they can say, look, I don't have the ability to impact my heat and air conditioning in the house, but in the future they might be able to say my thermostat is programmed properly and now my kids are comfortable.

Customers and communities can also feel that their quality of life has improved, so right now they can feel like I need to avoid any crime that's happening on the street or my neighbor is having a really tough time and now I can help them out, and in the future we're hoping that in the gunshot detector or energy trading world that

instead they could say I heard there was an incident and I was able to avoid and was able to move around it, but I worked on the phone or I was able to make a payment on my next bill.

And, lastly, customers who want additional support for the future can feel like they don't have any real appreciable skills and are unemployed, through our training and potential hiring programs, feel like they have learned some skills through their energy use that they can use on community jobs.

Okay. So I'm thinking about customers in smart cities while ultimately thinking about our utilities in the future, but we were looking at our operation in different ways. So from the bottom up, we have been looking at the physical network, the digital network, and the social network.

The physical network practically is a foundation for any related features, so think of poles and wires and really the physical platform that we got. I would love to give you $10 for reliability and $10 for resiliency and to buckle up

a layer.

The digital network provides a platform for the smart grid, and I think a little light came on, and also provide additional value for customers and the communities, and then the social network is really the network that we have to offer incoming new customers, and that means that we have got to connect in new and different ways with new products and services.

So how are we going to do that? The strategy that we are going to use to connect the social network and our customers with the products and services that they'll want to use, we are going to try to use through the smart grid exchange.

Now we understand at ComEd that our role is really suited well to be the connective tissue between third-party vendors and our customers, and so we really want to leverage with the customer, both the stakeholders and some vendors, also fill our end in relation to the customer.

To that end, the market had changed in

2014. We're leveraging that data infrastructure and looking at solutions, and we did that in collaboration with the manufacturers, developers, tech start-ups, and universities, but if you look through the box at the bottom, here are a number of items that we hoped to develop, peak-time savings which is a demand response program that key customers can use less electricity on select summer peak days.

Over to the right, smart-connected devices allow customers to hook up their wireless devices and their home devices allows us to hook them up to the smart meters so they can view and really keep control of their entire energy consumption.

The expanded energy platform is an expanded web capability to power resources with more personalized, more user-centered and energy measurement tools, and lastly, the energy marketplace will help scope out and connect customers with web-based-beyond-the-meter devices.

Now all of this new development was

prepared a lot of innovation, and so at the time when digital is going so quickly, we need a process to help us push forward pilot projects with third parties, and we are mindful of the fact that not everything that we work on will succeed, but, in fact, that we are helping third-party innovators grow and involve their products on behalf of the customers that really helps set up shop and grow the future economy in Chicago and also in Illinois. Thank you.

MS. PALIVOS. Anything for Jennifer?

(No response.)

On behalf of the Commission, I would like to thank the presenters for educating us on the role of consumers and building smart cities and we'll now move into the Q and A portion of the panel. I will pose a question to the entire panel and anyone can feel free to respond. Commissioners and Chairman Sheahan have questions first.

COMMISSIONER MAYE EDWARDS: I do, but I can wait.

COMMISSIONER ROSALES: I had a question on when you spoke about the neighbor that needed help to pay

his bills, how would you envision that?

MS. MONTAGUE: Through the energy portal, we can set up -- a number of ways -- we either can set it up so you would just be able to pay -- you would be able to help pay your customer's bill, which you can do now, through a gift certificate or you can set it up if you had -- if you are part of the community's hotline. If you are part of the community's solar project, you have access to energy and you want to be able to pay off your neighbor's bill, you can do it that way as well.

COMMISSIONER ROSALES: Security in terms of the community, I wanted to get clarity on.

CHAIRMAN SHEAHAN: I want to ask you a question that's sort of built on what has been made eloquently and made at other policy sessions that we have had.

You know, at the end of the day ratepayers pay for the infrastructure and whether it's a utility that provides some future smart service or a third party, I'm interested in your thoughts on sort of the economics of kind of who

pays, and who benefits and, you know, how -- especially how ratepayers can and will benefit.

MS. MONTAGUE: Are you talking about smart cities?

CHAIRMAN SHEAHAN: Smart cities or -- I mean, smart cities are sort of based on Smart Grid at some point, right? Infrastructure -- that's a public infrastructure. So whether it's, you know, an AMI meter or a smart streetlight at some point, you know, a ratepayer customer is going to pay for that infrastructure.

MS. DURAND: Well, I'll start. There's an organization called the "Smart Cities Council" and they have done a lot of great research on how to pay through smart city investments. In fact, they have a little financing guide, and part of the message of the smart cities infrastructure investments is to reduce the amount of overspend and waste that cities do by having silo databases, and so it gets complicated quickly, but just at very high Level one way for a city to save money in terms of operations would be to find a way to share data and then to use

that shared data to reduce the cost of the silo operations.

So, for example, there's data that streetlights throw off. I think Andrew talked about being able to see where citizens are, and there's data where, for example, the streetlights -- there's parking data, there's safety data, there's energy data. There's a lot of city operations that's overlapped, but its not integrated.

So one of the ways that the Smart Cities Council Financing Guide says to look at this is to show how to reduce those independent silo costs by cross collaborating on how to build databases, how to share data, and then how to reduce costs, whether it's streetlighting and so forth, whether it's safety sensors, because you need less law enforcement and so forth.

I don't have time to get into details, but in terms of the smart grid, there's a lot of money savings by not building peaker plants, by having that data that now consumers can see through peak-time rebates, and other ways, night and weekend

programs to pull their peak usage off of peak so that the utilities can save money either by not building peaker plants or not buying expensive energy on the spot wholesale market, and then those savings accrue back to the utilities and then flow down to the consumer. I would love to hear what others have to say.

MS. MONTAGUE: I think it's a great question and I'm sorry I didn't think of it.

Overall, we already have the monitoring enabling infrastructure in place, such as the electric grid and AMI network sort of help offset some of the costs, but the future energy plans provide the backbone for microgrids, greater energy efficiencies, and more solar generation, and so that's overhead, and not that that's going to be at no additional cost to customers over a 10-year life. Also, ComEd has secured some federal Department of Energy funding, $1.2 million for microgrid.

And, lastly, I will say that right now currently we have deployed about $250 million for

energy efficiency, so if there's a way for us to get greater leverage out of some of these funds, its smart grid infrastructure would be to everyone's benefit.

MR. KOLATA: I think in many ways this is the most important question, and I think we'd like to see sort of a world view that's exemplified by the smart grid exchange come forward as soon as possible. There's a lot of value. I think there's -- we appreciate the vision that ComEd is flushing out.

I would just note that a lot of what's been exemplified by ComEd that any utility could enable tomorrow by simply the functionality being solar, making sure the data moves seemlessly and quickly, a lot of this will be taken care of by third parties with a platform set up and a core functionality to enable and can be an innovation.

The political context of this -- I don't think has a fat chance -- is that, you know, I think as you play that vision out, it does require some changes to our overall regulatory system, just

as a practical matter, and then some of the stuff that we embedded in here to the extent that it touches directly distribution system -- here I'm thinking more on microgrids -- you do get into the sort of existential question of, you know, how are these services being priced and how are third-parties going to interact with the utilities on something that is still a core utility function.

I think those are -- there's a lot of interesting questions that we need to move forward on, because part of this, too, is ultimately do you want to give the utility somewhat of an incentive to encourage this world view faster, and, you know, I think there's 10 percent it has not happened, but to me that question, how do you enable the core functionality of what the smart grid network can do, and then how do you price new services, and who among you -- who's taking the risk, who's taking the reward, that basically is what the whole ball game is.

MS. PALIVOS. Commissioner Edwards.

COMMISSIONER MAYE EDWARDS: Thank you.

So, Jennifer, I wanted you to address -- I have two questions, but I want to address the first, and I know in my last question you responded by saying that they discourage the use of a generational, I guess, breakdown of demographics because it may lead to non-factual stereotypes.

Does ComEd believe that as well that you don't necessarily look at your consumer base generationally because of that same reason?

MS. MONTAGUE: We do use market research and we have what's called "prizm segmentations" where you have 66 -- so I think you have five of six -- we have 66 different sort of prizm segmentations. They are already divided specifically based on behavior, but then we also look at demographics. We look at age. We look at general background, and so all of those are included, and yet we hope to use that information to help figure out how we are going to market our program, and how we are going to send through direct mail or how we are going to get our on-line marketing.

COMMISSIONER MAYE EDWARDS: So it's very easy to

see your generation is based on market research.

MS. MONTAGUE: Correct.

COMMISSIONER MAYE EDWARDS: Terrific. My second question is kind of a culmination of the last three presentations that we saw.

So I recently read an article that talked about the evolution of the consumer generally. Obviously, every industry is changing, not just this one, you know, the airline industry, Uber. We have multiple things, and a lot of industries are changing because of the evolution of the consumer so to speak.

This article discussed the fact that the evolution of the consumer generally was being pushed by the rise of the millennials. They're now in the workplace. They're now living, eating, breathing in cities, and that is really what's pushing it.

So going back to what Anne said about the key of this, you know, smart cities and potentially what I would point to be the community of the future, that key engagement by the customers

and consumers is critical.

With that said, and I do believe that the rise of the millennials -- I think that the article is kind of correct. I believe that that's true, that is what's pushing a lot of the change specifically as it relates to technology, but we are talking about the community of the future. We are talking about the utilities of the future. This is all really surrounding the fact that the customer is changing, so will the consumer of the future.

If the consumer of the future is based on the millennials, how are you actively engaging millennials? Because I know, particularly when I am speaking to my peers, they have no idea, you know, what is going on, and based on Patty's research, 70 percent of the market is saying that they don't know what a smart city is. They don't know what a smart meter is. They don't know what a smart grid is, which is obviously very discouraging.

So how are you going to move forward with a utility-of-the-future strategy when yet the core crux of what the consumers have no idea what's

going on?

MS. MONTAGUE: So I think that's a terrific question, because from an educational awareness outreach standpoint, you are right. Most customers don't understand what we are doing.

In terms of the millennials, actually at ComEd we are looking at doing some market research, and that will focus on not only on parts of this but also focus on energy efficiencies, but we still at this point are still fleshing out what all of our value propositions going to be in terms of smart cities.

Once we have fleshed out our value proposition, then look at what does that say to our customers, so I don't have a complete answer thinking about it on that level. We haven't yet fleshed it out completely.

MS. EVENS: I would just add, I think Jennifer's earlier comments about we are trying a lot of things now, we are piloting a lot of things now, the more we can accelerate that so that we are learning things in real-time and not making long-term

decisions until we really have -- as we are making long-term decisions, making sure that we are making what actually works and what works for different communities across the city or the region.

And so I think, you know, I feel like a real strong call to action, that we have to get out there and really try things, see what works, pilots to build off what Patty was saying that we need to be iterative, like my cell phone has been, and really try to drive this now before we -- so that we can make sure we are actually going to maximize benefits for everyone.

MR. BARBEAU: I just want to make a quick comment. If we look at actually the rise of Uber and similar technologies, because people said that the regulatory environment sat down, and we think this is what communities or people want, it emerged from a regulatory environment and we had to catch up, so it's probably where we are going to more than likely end up once we get out of some of these enabling platforms that occur with the sharing of data and the opportunity for energy that's going to

create things that we can't predict right now. We're probably going to have to catch up.

COMMISSIONER ROSALES: Well, I want to thank you for this because we have struggled with this at the Commission with the calls we have received in a number of areas, specifically from different fractions which Commissioner Edwards talked about before, some of the consumers, some of the technologies are way ahead; whereas, others are past that.

It's similar to when students are coming in and some have much more knowledge than others in situations like this with lower grades, some know and some don't.

We are trying to find some sub-segments of how you get those folks, because it's not a one-size-fits-all pattern, so we understand this and certainly appreciate your efforts to get this done, so I just want to thank you, because we struggle with this, and that's really why we are here, and we appreciate your time.

MS. PALIVOS: Unfortunately, we have run out of

time^ overtime, so you guys are off the hook. I want to thank our panelists for participating and we should take a five-minute break.

(Applause.)

(Whereupon, a five-minute break was taken.)

If everybody can please take their seats.

CHAIRMAN SHEAHAN: Okay. All right. Will everybody take their seats. All right. That was a terrific first panel. All right. Thank you again for our panelists this morning. That was terrific.

We'll now we will hear from industry leaders and academics to discuss strategies for accelerating innovation for smarter cities.

To lead our discussion, I would like to introduce our moderator for Panel 2. Mel Gehrs is a Smart Grid expert from Silver Springs Networks. Mel has an extensive background in the fundamentals of a Smart Grid with degrees in electrical and nuclear engineering, 30 years of experience in the industry and eight years at Silver Springs. He's

been immersed in the technologies behind the Smart grid his entire career, adding to that four years at NASA in power energy, and computer systems development gives him a unique ability to understand and participate in innovations that will be required for further successful deployment in the smart grid and smart cities.

Please join me in a warm welcome for Mel and the panel.

(Applause.)

MR. GEHRS: Thank you and good morning. Are we on? Push the button?

CHAIRMAN SHEAHAN: There you go.

MR. GEHRS: Good morning and welcome. We have a distinguished panel this morning that includes Dr. Shadidehpour from IIT; Charles Catlett from Argonne National Labs; Michelle Blaise from Commonwealth Edison Company. We have Brenna Berman from the City of Chicago; David South from West Monroe Partners, and Mike Zeto on the end over there from AT&T.

Where I thought I would start the

discussion today is maybe giving you a few questions to think about while they are talking about their own particular definition of smart cities and smart grid.

So I think you are going to find that when you ask someone the question, "What is a smart grid and smart city," you are going to get a thousand different answers, so that's kind of the first question always asked is "What is your vision of smart cities? What smart grid and smart city projects is your company working on? What are some of the innovations that you see in the future? What are some of the barriers and challenges to smart grids and smart cities?"

I think this is one where we are going to talk about the costs and replacement on the first model. I think that's a critical one for discussion, "What Illinois policy and changes would you like to see made to stimulate smart grid and smart cities?"

And then if I were to answer the question like what smart city applications, it's

potentially all of these things. It starts with everything from smart meters, whether it's gas, electric, water to streetlights.

You can then go to environmental sensors. Argonne has been leading the way on environmental sensors for the Internet of things. It can be advertising panel. It can be bus in traffic. It can be management of the various processes in the city, like, for instance, trash removal, snow removal, things of that nature. It can grow to very large applications. In fact, from a size standpoint, I think these are conservative. It can be thousands -- tens of thousands, hundreds of thousands, and even millions of sensors in some way.

What I thought I would do is give you a couple of ideas -- I'm stealing from Michelle's talk a little bit. So I'm sorry, Michelle -- a couple of things that ComEd has actually done just recently. This is using smart meters to track storms and outages and how extensive a storm is.

So this is a storm in the Chicago

area. All of the little yellow dots are actually lightning strikes, and the size of the dot is how many kilo-amps struck that lightning bolt and the green and red in the area are where the smart meters lost power and got that power back, and the little red dots that are still there means there's a persistent outage in that area.

So ComEd can now dispatch their trucks directly to those locations as opposed to necessarily waiting for someone to call, so it improved their outage statistics considerably, and if you look at their statistics, in the last couple of years they have improved dramatically.

The other thing I want to show you is this was actually smart streetlights and smart streetlights joining the smart grid and the smart meters of ComEd, so this is using streetlights that have the same network interface card that ComEd has deployed in their smart meters in the Bensenville and Lombard areas and those lines that you see are actually smart streetlights talking to their smart meters.

Dave Kolata mentioned earlier the question of security. I just wanted to maybe alleviate peoples' concern. The Silver Spring Network uses the NSA Suite B encryption, so every single meter, every single streetlight uses the military-graded encryption, so we have not had any problems with security in the smart meters. In fact, Silver Spring has 23 million of these devices working today.

So there's a couple of examples of ComEd leveraging their Smart Grid potentially for other applications like smart surveillance, so I chose to at least talk about three of the challenges that I see in Smart Grids today.

About a year ago I sent a list to Dr. Shadidehpour of all of the things I would like to see electrical engineers learn while they were in school, so not only should they know everything about electrical engineering, but to understand cyber security, Internet protocols, radio RFF knowledge, data digitalization, Cloud technology, and big data, and he sent me a note back and he said

only Superman knows all that.

(Laughter.)

So that's the challenge, only Superman knows all this, yet, when you think about it as you broaden in that circle to LED technology, and gas, and water, and environmental sensors, and digital sign-age and electric cars, I would maybe argue that our technology today and how we educate students has got to get broader, or at least it's going multi-disciplinary, because the Smart Grid is about all of these things.

We are going to have to graduate more super girls and super men in the future, so that would probably be my first one is to challenge good education.

My second one would be -- I'm going to borrow this from my time at NASA. When you become a NASA engineer, the very first thing they brand on you is what's called "Technology Readiness Level," because it's one thing in a lab to try something, I have got it; it works, it's another thing to deploy a hundred million that doesn't work, and that

Technology Readiness Level is the scale that NASA developed to say, okay, it's in the lab. It works. It's just out in the field of limited development. We've done a full system test. We've now done a full litmus test. It's safe to shoot it into space, and while utilities aren't shooting it into space, when you deploy 4 million, 5 million devices, you want to make sure they work the first time.

So utilities and others -- and cities are challenged with this notion how well is this technology developed, what are the risks associated with it, and how many can we safely deploy over a lifetime? You have to ask yourself all of these questions. I think that's the second challenge.

The third challenge I think as in all of this one, you know (indicating). The smart grid started with electric meters. Why did we start with electric meters? Because they have power all the time. We went to streetlights. Why did we go to streetlights? Because they have power all the time.

Humans went to things that could be charged at night. How many go home and the first thing you

do is plug in your phone or plug in your electric car? But the problem is the Internet of things is about millions of things, dog collars, water meters, gas meters. Your kids clothing would never be plugged in.

So now we have to deal with this ugly thing called batteries. How are we going to deploy batteries? You still have devices to be deployed for 15 years. How many batteries last 15 years today? So I think batteries are a big challenge in Smart Grid and smart cities.

So with that, I'll kind of turn it over to the next one on the panel would be Dr. Shadidehpour. I want to kind of give you a little bit of background.

So Dr. Shadidehpour is Bodine Chair and Director of the Galvin Center of Electric Innovation at IIT. He's a fellow of the IEEE and a member of the U.S. National Academy of Engineer Doctors.

DR. SHADIDEHPOUR: Engineering.

MR. GEHRS: Sorry. Engineering.

DR. SHADIDEHPOUR: It's a pleasure to be here this morning. I was sort of asked to say a little bit about Smart Grid education and all that.

I would like to point out that I have been at IIT since '83, and this will be my 33rd year at the university, and, you know, I initially get excited about Smart Grid and all these new technologies through modernization.

A few years earlier we have seen so much activity at the education level and interest at the student level. Anything that these days has remote connection with Smart Grid they should lower energy.

I remember some 10, 15 years ago many were offering courses in the area of power generation. It was assumed what's new about energy, what's new about power, the same transformers and the same generators. These days every time you offer a power course, a course related to this subject of Smart Grid, we get like 70, 80, 90 students to the point that we have to close registration, because there's so much interest.

So definitely there is great interest from the side of tekkies to the point that they see the future because they see there are jobs. They see that, and it's not related or limited to utilities. They find jobs in companies that traditionally have nothing to do with -- nothing to do with energy, companies like Google, and Microsoft, and AT&T and they're expanding extensively in areas related to smart grid.

So I think there's a bright future in all aspects of that, but in particular we need to promote the subject of education at the general level that was discussed earlier.

One thing that I would like to bring up here is that when we talk about Smart Grid, Mel said there are ten different definitions for smart grid? Today you don't have to be concerned with a grid that's smart. It's the user that's smart. It's the operator that's smart who provides individuals who build the grid with ample data and useful data to come up with better decisions.

So if the grid is the silk thread, you

still have the generators. You still have the transmission. You still have the distribution system. We still have the goals (sic).

As I said, what is different now is that all those elements are associated with data and you have ample data, to some extent, sometimes too much data. You will find that you will help individuals come up with better decisions. The way it's being sort of portrayed all over the world is what's the issue with the Smart Grid. It depends on where you go.

In a sense, there are four major elements of smart grid and it's coming from all points of the issue, it is economics, the other is reliability, resilience, and finally security.

These are the four -- I mean, there are four steps to all these, but these four elements represent the essence of what we do when it comes to smart grids, and sort of the most important element of all basically is the eye-catching element of smart grid. It's turned out to be the notion of microgrids in the sense that pulling together a

boundary -- creating a boundary within the system that has all these smart elements to the point that you can manage that, or, as Jennifer pointed out earlier, the number of projects that ComEd has very eye-catching, very important projects from the point of Com Edison promoting Smart Grid information in the Chicago area.

We work extensively with entities outside of the United States. I would like to bring that out, because I feel that ultimately what we are going to see is that many countries -- other countries outside of the United States are going to be from the U.S. in the sense that as you are debating doing Smart Grid, what are we going to go with this? How many customers know what smart grid is? Who's going to pay for that?

Other parts of the world are going to take that idea that was initially, promoted and created because of American ingenuity and run with it and build it, the same way that the cell phone was done.

The cell phone -- the first cell

phones were created here, in fact, in Chicago, but then if you really want to see how many people use cell phones, go to Shanghai, go even to Rome, places outside the United States, places where existing communication system was defunct.

So rather than thinking about do we need this, who's going to pay for it, why do they have to upgrade it, then just scrap the whole thing and restart it and build anew and build it wireless and build it very strong.

I think the same thing is what happened with the smart grid. You are going to see other parts of the world are going to take the idea that you are discussing here and in the United States and promote that, build it, and expand it, and then ultimately it's all going to come back to the United States a few years later.

The projects that we do quite extensively, for example, in Sierra Leone and Africa, we have seen many, many advantages of these technologies. In those countries, in particular in places of the world where people have no access to

electricity, nothing, and some places in Asia where the advent of smart grids provided data, renewable energy distributed systems, smart sensors, allows people to have electricity available.

We went to places like Sierra Leone, you know, the middle of that Ebola outbreak, and we can see for ourselves how many people were dying because of the lack of clean water and hygiene.

You can basically communicate by using these technologies in the sense that those countries and many of those places where people drink water, they bathe, they use everything in that same water, and many of these diseases that we have seen in these countries are about creating a clean system that you can basically pump water from a well and you can prevent many of those issues that we are dealing with.

So also the United States sent quite a bit of medicine to many of these countries often across the globe. By the time the medicine gets to the patient, it's too late because it sits on the truck for the next 10 to 30 days. There's no

electricity. So by the time it gets to the patient, it's too late. So by creating these systems very primitive systems, we can save many, many lives.

So, of course, the story in the United States is different. Here we are talking about other issue if you go to New York, their primary issue is resilience, you know, getting rid of those pictures of the All Star Hockey for two weeks. Other parts of the country, California primarily economics, and everybody wants to have solar. First of all, they all want to have a clean environment or they all worry about Co2.

So different parts of the country, including the Midwest, different reasons, various reasons, that they promote the smart grid. All of it, I think ultimately comes to the notion that we want the same things, that is, reliable and more resilience and more secure, and I think more economical, and I think that's the way we move on.

When we come to the subject of smart cities, it encompasses a number of issues that were brought up earlier, namely, water, gas, electricity,

but all of that ultimately comes to the point that you are given the same sort of data, same consumer data.

So we're sharing data. You make the system to be more resilient, you want to make the system more secure, and you make the system more economical, and so we have started with electricity, because we know more about that, but I think ultimately you are going to see that is going to sort of other areas on the subject.

I think we are going to get to the point that we see -- somebody was asking earlier what's the cost of the Smart Grid, who's going to pay for all that, but, more importantly, what's critical is that there is quite a bit of improvement that we can come up with managing various infrastructures in the United States.

The higher infrastructure, to give an example, we keep building more highways in the United States and other countries, because everyone wants to go home at 5 p.m., the population goes up. Everybody wants to go home at

5 p.m. You keep building more highways. You look at the same highway at 5 o'clock, 5 p.m., the highways are all congested. Look at the highways around Chicago. Look at those same highways at 2 o'clock in the morning, there's nobody on the road. So, yes, we have to manage these highways. We have to upkeep them. We have to fix the roads.

As far as the business is concern, I think the highway infrastructure is falling in cement, and you get to the point that you have to build more, because people going home at 5 o'clock, and 2 o'clock in the morning there's no one on the road. It means that we did not manage this traffic properly or shifted some of those non-essential roads where at 2 o'clock in the morning we could come up with a system that's not so complicated, so expensive to manage, so difficult to operate.

It's the same thing with our grid. You look at 8 o'clock at night, congestion everywhere, and you look at 2 or 3 o'clock in the morning, very little to the point that the price of electricity gets to negative, that's so little

people are using electricity.

So by using this Smart Grid, providing information to the consumers, to the industry, so that they understand how this electricity is generated, what the price is, perhaps we can manage the grid more efficiently to the point that we can eliminate the peak, we can come up with a better environment, and more security to the system.

MR. GEHRS: Thank you very much. I should ask the Commissioners do you have any questions so far?

(No response.)

Good. So our next speaker is the Chicago Department of Innovation and Technology, DoIT. That's a catchy acronym.

Brenna Berman joined the Emanuel Administration in 2011 to focus on transforming the team at DoIT to align with the Mayor's commitment to an open and data-driven government, building Chicago's Open Data Program into one of the largest in the country, implemented the ground-breaking "WindyGrid" spatial analytics platform into every level of government, integrating advanced analytics

and real-time, data-driven decision-making across the city and setting a new standard for government IT.

This has meant adding new skills to the team to increase the focus kind of like the challenge we see in new skills on software, engineering, and analytics, improving the department's commercial partnerships to drive savings for the city, identifying groundbreaking civic partnerships, including hosting regular meetings with local female tech start-up owners.

MS. BERMAN: So I'll start with the question you asked first which is how we define smart city, and that's a short answer, because we don't. We stopped trying to do that because it's just something that totally separates many U.S. cities from our counterparts.

When I talk to my counterparts in Europe, they'll have a smart cities strategy available but not develop a smart cities' initiative, and here we really focus on being data-driven and turning our data into a strategic

asset and on being responsive.

Now that's leading to namely the same initiatives that would come under a smart city rubric, but we stopped trying to adapt to that. Frankly, it's become a marketing mantra many companies and really just focus on the technology, and many of these new IT-connected technologies -- sorry about that.

We really focus on adopting a lot of the connected technologies that could help the City of Chicago be more responsive to the needs of our residents and make the most of the limited resources that we have here in the city.

I will actually talk briefly about a couple of those projects, because frankly I am lucky to have partnerships with many of the people in this room, and I have a feeling that they'll be talking about some of the things we are working on as well, but we have been using our data to drive predictive analytics in areas that range everywhere from -- frankly, I am the butt of a joke around the office, and it may sound funny, but that rats are a very

serious issue, and we don't need these issues, and can be real quality-of-life issues, until we apply predictive analytics, and we won't have the budget to cover two-thirds of the city with that service.

We were able to reduce the cost of our operation by
20 percent through analytics and expand the service with those savings to the rest of the city.

So while that seems like sort of a small win if you are in a neighborhood where rodents are a problem, that's actually something see the benefits of every day. Predictive analytics really can play in any part of the city where you have resource constraints, and that's something that the government deal with at every level every day.

Our use of data expands into the IOT space. Charlie will talk in a minute about one of the our at most innovative projects about the amount of data that we are going to be increasing through such a project, and one of the things that's become a theme for us in Chicago is the way that we are leveraging our own efforts through strategic

partnerships.

So what you will see on the slide here is actually affecting driving innovation through partnerships, actually a relatively smart department for the amount of work that we get done, right now a hundred people, which sounds like a lot until you realize that a hundred people is responsible not only for all of the innovative smart city work that we do, but also all of the day-to-day operations of the city, like our E-mail, our server, things like that.

So we have a lot of really interesting partnerships that branch across our civic tech community. Chicago has one of the most vibrant civic tech communities in the world, more than 500 technical volunteers that I can call on in a moment's notice to help me develop an app for improvement of functionality that I have in the existing city application, and they rely on the city's open data program to make that happen, and other cities actually have followed with that model. It's not something that's unique to Chicago, but

ours is quite strong and it's something we depend on.

We have an active philanthropy both here and in Chicago and elsewhere that fund our work. Although the predictive work that I talked about is also based on a grant from Huber Philanthropic, we have others that support our work as well.

Community service organizations, these are organizations like Mullet Tech that train high school-aged students here in Chicago to code. They spend 10 weeks in the summer -- six weeks in the summer all day long learning how to code. If they stick it out, they get their own Chromebook at the end of the day, and these are kids that will hopefully stick to that technology as a career and one day will fill some of our needs as we try to hire people into the community, and those community service organizations engaged with my department are hoping to fill that gap around digital skills here in Chicago.

Academia and the national labs,

Charlie could speak to that. How many projects do we have now? We lose count. We have become an extension of each other's team by partnerships with eight different universities, most of which are here in Chicago and the Illinois, but not all of them are here. We partner with the University of Southern California, with MIT, with Harvard, Aspen -- I'm not going to complain -- government partners, and we work very close with the county.

I'm very excited about the new CIO here in the state and have a very long relationship. I took his job. He and I worked together when I was at IBM. We worked together at Sysco. Again, that partnership will lead to a lot of new work as well.

So government partnership across the levels of government you'll find in many cities lead to better working together, and I think collaboratives are really interesting.

So one of the things that many cities will tell you, especially around smart city technology, is that they're very hard to procure in the traditional ways. Some of the things that we

talked about today for me to go right into the traditional RFP to buy some of these things doesn't really work.

A lot of these things are still under development. They're experimental. A lot of the companies that we'll partner with need a partner to come into an urban environment and test them, and pilot them, so you are seeing formation of collaboratives to help work through these new kind of business models, and one of the best examples there is UI Lab on Goose Island and City Digital partnership where the city is partnered through a non-profit channel with some large corporations to build new smart technologies or pilot them here in Chicago and commercialize them for other cities, and then, finally, corporations. So cities have always done business with corporations, but now I feel like performing partnerships with corporations -- and some are sitting here today -- and not just for like the vital services that you always contract with them, and Michael will speak to that.

Now we are building things together to

address critical challenges that we have here in Chicago, and we'll let him talk about some of those things and how we are working together to address the problems that Chicago is facing as our resident population is growing, as their demands are increasing, and Chicago will have to meet those demands so those people can be happy, and healthy with their families and their businesses here in Chicago. For us, that's what a smart city is. It's responsive and efficient and effective.

MR. GEHRS: Thank you very much.

Commissioners, any questions?

(No response.)

Good. Okay. Moving on to Charlie Catlett is the Senior Computer Scientist at Argonne National Laboratory and the University of Chicago where he is the founding director of Urban Center for Computation, Urban CCD.

Urban CCD brings science together from Argonne, University of Chicago and other institutions to develop solutions to improve their measurement, analysis, design funding in the urban

system.

He recently co-authored the report Technology and Future of Cities a Study and Recommendations from the U.S. President's Council of advisors of science and technology.

Charlie, welcome.

MR. CATLETT: Thank you. First off, let me explain what it means to say we have a project called "Array of Things." It really puts together the Internet of things that you have heard people talking about all morning long with the concept of Array tells us what you see in the left-hand side of that picture that are fairly powerful in themselves, but when you put the data together from all of them, they give a much sharper, deeper picture of what you are looking at.

So the Array of Things project started actually with a summer workshop that began with high school students in downtown Chicago where we had the idea that we would teach high school students how to build, assemble an air quality sensor, and how to choose places within a large city like Chicago that

they might put those sensors to Cloud data, and then kind of analyze the data afterwards.

So we had the idea we'd build these things, put them out, leave them there for a couple of weeks, and then analyze the data.

When we sent the kids out to find places in the city to put these sensors, they came back with their sensors in hand and said there's nowhere we can keep them in or they will be stolen if we leave them out there and this seemed sort of obvious in retrospect, but we were young and inexperienced at putting things in the cities.

So I went to John Toller (phonetic), the CEO at the time, and talked to Brenna and others, and I said here's an opportunity with the emergence of smart cities and grids and Internet of things, technologies -- if you had an opportunity to have an impact here in Chicago in growing the number of companies that we do business here that develop technology here and teaching a new generation of students about technology in supporting a lot of interesting and useful science about how cities work

and how they affect the environment, if we could some how make it easier for them to place devices throughout the city, and we involved into an Array of Things.

It started with the idea that we would just put some boxes out there that you could lock things in and they would have power and the Internet, but then we thought if we were going to put boxes out, let's engage the science community and ask what they would like to measure about cities, so we had a series of workshops with 30 or so scientists and different disciplines from as many universities and national laboratories and design devices. I'll show you a picture of it in a moment.

The idea though -- let me back up to the whole smart city thing. The report that is referenced in my introduction there, Technology of the Future of Cities, we spent about a year about 20 of us from all different parts of technology, and government, and cities, and universities, and labs, trying to think beyond just what's going to happen anyway, let's see what's going on. We'll have

smarter parking, a lot of smart cities stuff is going to be inevitable and how cities prepare themselves for changes in technology, changes in the climate, changes the way people interact with cities, people starting to sell their cars because it turns out that if they own a car in Chicago on average parking, insurance, and the cost of the car, and gas, is equivalent to about 6,000 miles in a car-sharing service like Uber or Lyft. You can just do that math yourself for your own car and ask why do I need a car.

In the report we looked at cities and we looked at really long-term goals for cities in three areas: One, efficient cities, green cities that would be sustainable in the use of resources and that would minimize their impact on the climate and environment.

Second, even for mobile cities we can move goods and people could move around fluidly in big cities. We talked about before congestion and transportation, and then the third, which is something that I think a lot of smart city projects

fail to take into account is that it's fine if you can help someone park their Tesla more conveniently. Chances are that person is looking for parking and the city's working fairly well for them, but how can we make cities work better for mass parts of the population that the city is not working so well. So how can we not just make cities more efficient and more mobile or convenient but also more connective in a neighborhood for all the people that live in the cities.

Now the Array of Things project we have funding based on work we did funded by the Department of Energy and funding through the National Science Foundation, so 500 devices throughout the city, and one of the things that motivated us is on the left here, those are the EPA air quality sites for the City of Chicago. The weather map for -- the official weather station is even more sparse, it's just Midway and O'Hare, and then there's a do-it-yourself network of weather.

But if you want to know about air quality and some higher rates of asthma on the west

side of the city, you can get help if you know the measurements what's happening there. So we said one thing we need is more higher resolutions of data about what's happening in the city with respect to air quality.

On the right-hand side -- one of the goals of our project is actually to put super computers right down on to the street, which is now more affordable than it was years ago when they cost $20 million and they still cost a lot of today's super computers. Well, what we spent $10 million on in 2000 we can now buy for $400.

So what do we do with one of those on the street? If you want to try to use sensors to moderate an intersection, keep those pedestrians from getting hit by those cars or detect them from high speeds as the cars that are coming and the wheels have stopped turning as they're coming to a halt, we need to process right there, and in real-time to you can't send this data back to some Cloud in Seattle or San Francisco to have its computer tell the intersectionwhat to do.

So part of our project is sensing. Part of it is what can you do with computations right then and there on the street.

Now we have education goals and economic goals, and I will say we are very proud of the fact that these devices that you see here, and you can see here in the upper-right are columns in the folding in the first prototype, these boxes are designed here in Chicago. All of the boards that we designed are actually made in Schaumburg, and the assembly and all of the packaging for these devices is done in Lake Zurich.

So this is a made-in-Chicago and/or made-in-Illinois device. It is the first of its kind that is open source, which means that for non-commercial use a university or laboratory can ready modify these. In fact, the national laboratory will modify our packaging so that this will run on top of city buildings in New York City. It collects environmental data and temperature, humidity, barometric pressure, vibration, magnetic fields, also collects six different gases, ozone,

carbon monoxide, nitrogen minoxidil, sulfur oxide, and others, and that's part of it.

So we can see with this new device on top there that fits inside that beehive, we can see particle matter that's at 2.5 microns. That's the stuff that you can't see. It doesn't cause smog, but it goes right into your bloodstream into your lungs, and that's really dangerous particulars, but that's also been modified by colleagues at the University of Texas at Dallas. It also can detect pollen which is something that causes a visible effect in some of us if exposed to it.

So we have these sensors that we have them embedded in there. That process is particularly important because you may have noticed there's a camera right there at the bottom, and if you point out into an intersection, there's another camera at the top sort of here in this box here (indicating). There's also infrared that gives a certain service.

So we have cameras in the public way and that means we have to think very careful not

just about security of the device, as I say, we have people at Argonne National Lab on my team that do computer security at the National Laboratory who know something about computers, and that's something we know has gone into the design of this.

It's very interesting to look at privacy because you walked past -- you probably walked past 30 cameras on your way here and whenever you go into the city. You know, what's being done with those images, who has those images, how long you save them, you don't know.

So we've sort of gotten use to cameras watching us, but we think there's a better way to do that, and part of our partnership with the City of Chicago is about policy with respect to putting technology out in the public way, and the cameras are really a good example of that.

I can tell you, and you are a technical person or have your staff verify that our software and our systems are secure. I can tell you that in a normal operation, if you look at the software, we don't actually pull those images out

and save them. We will process them on the device and then throw these images away. We process them to look for surface flooding, to look and count the number of vehicles that went through the intersection, and we toss those images away.

So we have an architecture that respects privacy with respect to images, but we also have an overall accountability, and I will also come back to that.

We have an overall transparency with respect to a governing process that Brenna and I have been working and welcome into public comments on. That includes a privacy policy that has certain commitments that we made with respect to a governing process before these are allowed to go in the public way, and that's good, too, because of transparency of policy, the software and hardware, you can verify, if you're a technical person, that we're doing what we say we are doing.

But the third piece, which is really important, is accountability and what we have done is we have gone -- because we have funding from the

National Science Foundation, we have gotten an external independent privacy and security review team to oversee this project from that point of view.

So when we want to make a change out of the sensor at that privacy location, that team of people from the University of Chicago, from the EFF, from ACLU, from West Point -- it's a very distinguished set of experts -- they have an opportunity to the public to advise the city on whether we should do this change to the platform and how we would be directing for education.

And then let me just sort of -- let me close here with one question. With 500 of these, where do they go? We have interacted with enough community groups and individuals in the City of Chicago to find that there are plenty of places in the city where we can start with something that's of concern to the residents and businesses, and they're expressing to us things they're concerned about, urban flooding, concerned about air quality, and asthma, and so we said we have this platform that we

can^ weak ^ week measure that and we can get some data and we can partner with you.

The second ones we have something that people are interested in is we have community scientists that already have the research funding. If we gave them better data, they could help us with some insight on what to do, and if we have those two things, then we are almost there.

The third thing we need is a partnership with the city, as we do with the City of Chicago, where if we had that even better insight into that institution, the city could better adapt, or invest, or intervene to address the issues that the people are concerned about. So as we go in, this is very much a partnership with people in the communities.

So I'll say a couple of things. One is the data from these devices is completely open, completely free, and the city will make it available to the residents through open grid, which is their open source, meaning it can be easily replicated in other city's portal that it's designed for residents to get data about the city around them, about 3-1-1

calls, the services that were done and soon when these devices go up about the air quality, about the temperature, about weather.

The second thing is in terms of education going back to why we started this from a workshop, we also have developed a curriculum that we are in the process of demonstrating or trying out right now with 150 students at Lane Technical High School on the northwest side and that's a six week curriculum that takes kids through the Internet of things, how to build a device themselves, then how to deploy them in school. That's something that we feel is something that can be replicated.

I will just close with this map. These are the other cities that have expressed to us a plan that they would like to pilot this technology, so we have a chance I think with this technology to affect what's happening in other cities, and Brenna, and I, and others are particularly interested in having an impact in these areas of privacy and policy as we learned in Chicago and show these other cities the way of proceeding

and moving forward, so I'll close there.

MR. GEHRS: Thanks, Charlie. I appreciate it. Questions from the Commissioners?

(No response.)

I will actually jump down to Michelle, a slightly different organization supply. Michelle Blaise is a Senior Vice President of Technical Services and is responsible for engineering, project management, and Smart Grid technology for ComEd.

Prior to her role as Senior Vice President of Technical Services, Michelle served as Vice President of Engineering and Project Management and oversaw maintenance, reliability and capacity planning.

She was also responsible for planning and execution of transmission and substation projects, as well as the execution of energy infrastructure modernization, or EMA. Michelle holds a bachelor of science in mechanical engineering from IIT, right? And we want to get in a masters in business administration from DePaul.

MS. BLAISE: That introduction may be longer than my talk.

(Laughter.)

Thank you, Chairman and Commissioners, for the opportunity to talk today on this topic.

We really see -- I want to start about how we see the smart city's home from a political perspective. We really see this as a road map that starts by leveraging the infrastructure and the work we've done around developing the smart grid builds into building capacity and testing out different uses of that grid in new technology that interconnect with that grid, but, foundationally, it's really empowering and enabling the workforce of the future that will allow us to continue to grow and create these smart cities.

So, as we look in the horizon, we believe that trend is why customers will be driving the development of smart cities in the community of the future, and we see that it's a future in which customers will want clean, lean, custom, reliable, resilient, and secure energy while retaining the

foundational policy goals of electric distribution systems that are accessible, affordable and fair.

So three main trends that we are seeing from a customer's perspective are growing viral concerns. First, from the world that's increasingly driven by climate change, we think customers care about the environment and the carbon footprint, so we see a growing interest in renewable energy resources, solar batteries, not categorized but solar resource of energy.

We see changing consumer demand as a second trend in that customers are more and more in a living 24/7 digital world where consumers everywhere, and, as well as our customers increasingly are desiring services and products that are customized and personalized for them, and, thirdly, technological advances that are really driving costs of technology down and as well as technological. All this will enable the grid to be smarter.

So what we do know is business as usual is not going to work. While we see a smart

city, a smart grid is foundational to a smart city, but having a modernized grid all in itself doesn't really make a smart city.

What we want to do is leverage a smarter, more reliable and resilient grid to support a broad range of emerging technologies and serve to meet our customers' needs. We're testing out some of that now, the smart streetlights you've heard a lot about so far this morning, so I am not going to talk too much about that, but we are testing out in a couple of communities the concept of smart streetlights.

So we are learning a lot about how we can leverage our AMI communications system to provide other services, LED streetlights with some smarts that provide information to municipalities about their usage when the lights are out enabling us to provide better customer service to them, but there's a lot of learning that we have had.

Now we are thinking about how can we leverage computer records to communicate in the smart communication's system network that we built.

As far as thinking about the water meter, there are opportunities there in the same way that we are using the AMI or the communication system for streetlights or water metering, information building, leak detection. We are starting to develop and design how can we do that, how can we partner with some other water meter companies to enable that.

Third, a couple of other work we are doing, and you've heard a little bit about our DOE Grant, we received a $1.2 million grant from the DOE to test out a microgrid controller.

We talked earlier about what we see is more and more distributed generation on our system, could potentially be seeing greening microgrids, so this grant will enable us to develop a microgrid controller which is sort of a brain that will enable two microgrids to operate in parallel, share resources, really optimize the ability to have those systems.

We are working with IIT as a partner as well as other partners in developing this

product. It will be the first of its kind.

We are also -- in our feature energy legislation, we are proposing piloting six microgrid -- multi-purpose microgrids to look at critical -- how do we protect the critical public infrastructure, hospitals, water resources, emergency response facilities in the case of catastrophic events.

We want to test these out, learn from them, and better understand -- help us better understand how -- in a world where GE or distributed generation how we operate a grid in this new world for resiliency, for maintaining integrity of the grid with all of this new integrated technology going on.

We are also looking at technology as life batteries, how can we use them to improve reliability, so we're piloting a couple of small scale batteries as a reliability tool in our toolbox to improve local reliability issues.

We also received eight DOE grants to build solar with a battery backup facility, and we

are going to do it as part of the Bronzeville microgrid project, really test out all these different types of -- how do you integrate distributed generation renewables? How does that all get integrated into this grid? How do you operate this grid? We expect to learn a lot from that along with our partners.

Those are some of the examples of what we are looking at as we think about Smart Grids and how do the utility fit in there and how do we enable that, so the broader perspective Jennifer Montague mentioned about the community of the future.

I want to use Bronzeville in the sense that we try out different technologies, not just grid technologies, but partnering with others, as well as the community, to see how we can bring solutions to make this community more liveable, sustainable to meet the goals of what we see as the community of the future.

Lastly, I talked about enabling the workforce of the future. We are really focused on

all the different ways this new grid is going to be requiring different skill sets, new technologies, new ways of operating the grid. It's going to require new skill sets, new ways of thinking about who we are as a utility and how we operate.

To that extent, we feel that we need to invest. We need to invest in the future workforce, as well as our current workforce.

Things we are doing, for example, is the Ice Box Derby really focused on building to send awareness in young girls. They get to build a refrigerator out of recycled -- they get to build an electric car out of a recycled refrigerator over four weeks in the summer and erase it. They really watch, and grow, and learn what they can do with their interest in science, and engineering, and math.

We are also focused on looking at solar spotlights and other types of projects that we can engage young people in to introduce them to steam as well as they look at future technologies how they can better understand how these new

technologies work and they get engaged in it.

We are also investing in our current workforce. We are developing programs to really build the capability of our engineers in our professional workforce.

You've seen -- I think most of you are aware of our training center built as a part of the IMA building our craft skill sets, also focusing on our engineers and helping work through developing their technical capabilities.

We also are very much focused on industry participation, benchmarking with other utilities, benchmarking with utilities in the U.S. and outside the U. S. to understand the work they're doing around Smart Grid and how they're developing new technologies. You can see how we can implement those here.

Other things we are doing is a reward recognition. We realize that building culture innovation is going to be the key for us as we -- in order to develop this sort of asking questions, thinking differently.

We have built several programs around building innovation in the organization. We received awards for work that -- projects that we have done from different organizations that recognize innovation, and here is an innovation award for smart grid. One of our folks developed a manhole flash shield to be pretty simple to help improve safety around all the working manholes. They were everywhere, top hundred finalists in Chicago.

Those are the things that we are doing internally building the capability of our workforce and trying and testing new things. We think that's where we see our role in the community of the future and smart cities. Thank you.

MR. GEHRS: Thank you, Michelle.

Commissioners have any questions?

(No response.)

Great. Back to David. David South is the senior principal in the energy and utilities practice at West Monroe Partners and leads a sustainability practice. His 35 years of power

generation distribution, energy resources, mission control technology and related markets and strategic and regulatory assessment experience.

At West Monroe, David works on market and business transformation issues associated with clean energy and sustainability initiatives at the state, regional, and national levels.

David joined West Monroe Partners from Technology & Market Solutions, LLC, Consultants. He founded that work with start-up technology companies. Prior to that, he spent 15 years at Argonne National Labs.

David, did you know Charlie Catlett when you were at Argonne?

MR. SOUTH: Unfortunately not. Here we are.

MR. GEHRS: So you had your meeting here for the first time?

MR. SOUTH: Yes.

Thank you, Chairman and Commissioners, for the opportunity to talk to you. I concur with much of what's presented this morning so far about smart cities and to the fact that it's a very

difficult thing to define.

What I have been asked to talk about is the role of innovation and data, and you've heard some things already about innovative technologies that are moving into the market, but many of those are really at the foundational stage of their evolution and you need to move those technologies more than a trivial level and move their risk so that they can be readily adopted and that they really have a business case for being in the market, not just a smart meter.

West Monroe is working directly with utilities and cities around the country and through the Smart Cities first to examine some of these smart city strategies, roadmaps, business cases, implementation plans, both for individual smart technologies, like streetlighting but also more comprehensive technology rollout. This draws on our work we do on AMI, analytics distribute resources and operations excellent.

As indicated in a previous discussion, understanding the problem at hand, identifying and

accessing the barriers, defining the use cases, and the consumer engagement is key to the success of any smart city design and a technology road map.

This will help us define the road for the landscape for an applicable technology innovation, its development and subsequent deployment.

In this first slide it shows that innovation will move us to unrealized value of smart grid technologies as well as smart city implementation and interconnection of all of those technologies, the Internet of things in a way, but also on the generation side as well, but we must clearly define the problem in both ours and the consumers' expectations and what they see as the benefits arising from these technologies.

This can initially be accomplished through pilot testing where the expected costs and benefits can be validated with those ultimately realized and identify any of the associated issues, such as those identified by the earlier panel, that can be documented and addressed before you begin

deployment.

Pilot testing is only the first step in validation. The technology must have been assured to a readiness level where full deployment risks have been substantially addressed more than anything.

While we have some incubators in the city and elsewhere around the country, we will need more viable test beds to demonstrate this maturity and viability for technology deployment and the benefits utilization that's required for the business case.

The other challenge of technology innovation is that value can be monetized but not all investments pass the strict cost-benefit test. The full spectrum of benefits and issues associated with smart city technologies and its data stream must be clarified regarding attribution, ownership, risk, and time frame.

In this next slide I'll show you that the ability to collect the data on technology performance and user experience will benefit the

transformation of those beds in the information and intelligence that when coupled with analytics will clarify and permit the realization of those societal benefits that have been identified to target consumers and customers.

This will then support the business case of a smart city technology and support even further innovation and evolution of the smart city design and its integration.

Data is key to the successes of smart city technologies, their integration and subsequently their sustainable operations.

Defining the pathways of data collection, analytics, translation of information, and benefits can be articulated but they do have technology, bandwidth, ownership, regulatory, privacy, security, and other challenges that all must be discussed and resolved.

really addition, as discussed in the previous session, consumers, who fall into different groups, must be educated in a way that's concrete to them so they understand the data and information

that's being generated in these smart technologies to ensure that they realize the benefits of these smart city technologies both today and tomorrow. Thank you.

CHAIRMAN SHEAHAN:

MR. GEHRS: Thank you, Dave.

Any questions, Commissioners?

(No response.)

If not, we will move on to our final panelist. Mike Zeto is General Manager and Executive Director of Smart Cities, a business unit inside of AT&T's Internet Office Solutions.

Michael is responsible for the teams that drive the product development, business development and market strategies for AT&T Smart Cities Initiatives.

Mike is also an industry fellow with with the Georgia Research Alliance, an organization that makes investments in university professor-led research projects that generate IP-based technology solutions that can be commercialized.

Prior to joining AT&T, Michael was

co-founder and CEO of Proximus Identity, a locution-based consumer engagement software company.

Mike.

MR. SOUTH: Thank you very much. Thank you, Mr. Chairman and Commissioners. I appreciate your having us here today.

As you've heard, I have a pretty diverse background and it plays well for the space that AT&T is starting to play in, and that is smart cities.

So I am going to actually take a shot at defining what AT&T thinks a smart city is, and that's really because when you develop business cases and large corporations, you need to have some parameters and understand the problems that you want to solve for the markets, and so to us, AT&T smart cities uses technology to connect people, process and access in order to improve sustainability, reduce operational costs, and drive economic development, and to deliver a better living experience for the citizens in the communities, and towns and cities that we serve at AT&T.

We feel that a highly secured and integrated communications platform is the thread that's weaved among all these solutions that are solving problems and adding value.

I think, you know, there's some good points of view that we have heard this morning here, and in others some good points, the rest of the group up here as well, It's a very collaborative environment that we need to create. It's an ecosystem play that's not one company that can do it all.

So, we all need to work together, and that's from the national research institutions, to the commissions, to the utilities, and it's not just about Smart Grid, even though we are here talking about that today, that's not what it's all about. That is the piece of creating a smart city and driving efficiencies, but the consumer engagement piece, the public safety piece, the rest of that is as important in some communities or areas of the city, or region, or the state as Smart Grid is. So I think you will see that our approach is not to be

held up.

So for the next 10 minutes, if you would not think of AT&T as your phone company or your cell phone service provider, think of us as a technology company and a technology company that can lead in areas like smart cities, like you have done in IOT.

Charlie talked a lot about it. Brenna talked a lot about it. IOT is the foundation of what a smart city actually is.

Smart city is really just applications that are using IOT technology and we have long-standing relationships with the cities, municipalities and state government.

As a company, we have got strong partnerships through our government, education, organization, working with the city in partnership, and also our external affairs organization.

Why this is important is of the tens of thousands of municipalities and cities that we serve throughout the United States, we have the ability to keep our finger on the pulse, and so I

run the global business for AT&T, so I have the opportunity to bring a global perspective to spotlight cities that we started engagement, like Chicago, and AT&T has chosen to develop a framework, which I'll talk a little bit about as well, which will help to break down some of the silence and create a realistic strategy throughout the city. We really feel like we've earned the right to participate with those that are sitting here and some who spoke before us to help lead Chicago.

So this slide is really just at a high level. What I want to point out is, again, we have got 135 years experience as technology pioneers and innovators.

If you take one thing away, again take away that AT&T is a technology company. We are constantly innovating. We do some of that at the network level and we do provide some of that network level innovation to businesses and to consumers, but we are also innovating in other ways. The business models that we talked about that are going to be needed to pay for funding some of this, again, are

all part of the framework that we are going to deploy in cities.

Security, privacy, those are words that were used often when the people spoke before me on this panel and the panel before us, and really, you know, this isn't to brag about what AT&T does and how many subscribers we have. This is basically to show that we address not only consumer needs but business needs. We do it globally, not just in the U.S., and security is first and foremost on our minds.

So we've talked about the Internet of things or the millions of devices that are going to be deployed across the City of Chicago, and across the region, and across the state, that are smart city-related using the IOT foundation.

We are looking at security from a license perspective, from a network perspective, and from an education perspective, and then also 24 by 7, 365 analysis, and that's one thing that obviously utility companies are certainly concerned about, securing the grid, but you also need to think

about the other devices that are out there as well, and that's a big part of our strategy, and we've got internal teams dedicated and focused to that, and we work very well in collaboration and partnership with research universities, and cities, and then other private partners that we can talk a little bit about.

So from a framework perspective, I mentioned that AT&T announced it launched a framework in January, and so AT&T's smart city framework the goal of it is again really to include partners and best practices into specific solutions and business models that can be scaled across cities and across regions, and our goal is to build a framework that's 70 to 80 percent defined and 20 to 30 percent customized.

The reason that's important is because you've got to build something that you can repeat across a city, so each neighborhood may have a specific problem, just take the City of Chicago, that they want to solve, but then some of the problems that you are trying to solve in the

neighborhoods are also known.

So if you have the ability to take a framework and test it in an area of the city, similar to what ComEd is talking about doing, within a framework and somebody needs that, you can then take those key learnings and provide that back to the citizens and to the parties that will help to drive adoption and funding capabilities to make sure that the framework in key learnings can be adjusted and then can be scaled across the rest of the city, and across the region, and across the state.

So the four pillars that we will be focused on are core connectivity, which is where many of our core business offerings are at, and there's going to be multiple pipes of connectivity that's going to be needed.

When you talk about energy and utilities, one of the analysis that we just made was actually that AT&T will be offering to utilities the private LTE network specifically for that utility and that will be AT&T working in partnership with Nokia, one of the alliance member partners. They

will keep developing hardware and then utilities will still be able to procure that in a way that they want to procure it, and then AT&T leasing spectrum for 10 or 15 years versus inadequate or out of date from our spectrum, so you will be able to develop and have a highly-secured network that is LTE.

The second pillar is platforms, so we have got platforms that enable many different things, and these aren't necessarily just AT&T's platforms. These are strategic alliance member platforms as well. You need to be able to control all that connectivity. You need to be able to secure it. You need to potentially be able to build it to multi-different departments. You need to have Cloud offerings, and you also need to create developer environments, and developer environments like MS and Flood platforms are important, because if you look at the initiatives that Brenna has spearheaded here in the city, and you talk about open data and being able to use the data and allow people to have access to that data, one of the

things that you are trying to do there is encourage economic development. You are trying to encourage cooperation, innovation, and allow for entrepreneurs and companies to again innovate on top of that data that's available and then hopefully from that will come a lot of good for the city, whether that be in economic development, job creation or an actual service that the city can use and provide benefits to the citizens.

You have got vertically-integrated solutions, and, again, we break these out into five solutions. Energy utility is important, one hundred percent I agree with you. Grid is important, but you also have to think about transportation, travel, partnership, citizen engagement. How do we engage the citizens? The panel previously talked a lot about that, and I think that's a very important point.

You need to engage the citizens. Some of the things that we will be working with the City of Chicago on is actually using data to engage the citizens. We are working with a University of

Chicago group right now, and the lens that they're looking at smart cities group for us, for AT&T is how do we provide services that the citizens, right, the city customers, actually will want to consume and where should we allocate all these as a city, as a region to help meet those needs, and so the University of Chicago is working with us there.

Public safety, nothing needs to be said. First and foremost, on every neighborhood across the United States and the infrastructure, whether that be buildings, or whether that be roads, or bridges, an interesting point of fact about AT&T is that we use as much energy as Cuba and we are at last count the second (sic) largest real estate holding company in the United States behind the federal government.

We have, even our own doctors (sic), and over the last say five years we saved several hundred million dollars in energy costs, which not only saves money but provides value to our shareholders but also creates a positive sustainable and passive environment.

So AT&T is very active, and we've

learned a lot from our energy management programs and we are also starting to commercialize those so we can roll those key learnings out to the market.

Lastly, and probably most important here, is collaboration in the ecosystem that collaborates together. Our strategic alliance network, they're large companies that have proven technology, SYSCO, IBM, Deloitte, Ericcson Intel, Telecom, GE, and you will see that Southern Company is there as well.

So we are also engaged in utilities and driving innovation as they look at services and improve their customers' lives as well, and then the spotlight cities, moving to the far right of this side (indicating) the goal of a spotlight city was to basically go in and deploy the framework, work with the cities and choose three to five solutions and help the cities to break down some of this.

Cities, as you know, are very sovereign, young in general and very sovereign, and there's a lot of smart projects in the United States, but there's not a whole heck of a lot of

smart cities in the United States, and the framework and the point of the framework is to go in and to help the cities start to collaborate, work together, bring in the right ecosystem partners that have the means or have the resources and help cities pilot new technologies or technologies that are proven that need to be inoperable and integrated together, so all that data can be aggregated up to a way that -- in a way that can be visualized and made sense of.

So you understand that if there's a traffic jam in the Loop, you understand how it's affecting revenue at the meters, or in garages, or there could be social sentiment and backlash that comes from that.

You want to be able to take that and bubble it all up, so not only the mayor or counsel can understand easily, but so the citizens can as well, and you have had an opportunity to be pretty transparent if you want to with your citizens and any data -- visualization data application like our AT&T Smart Cities Operations Center, those types of

tools, the visualization applications, can actually be not only shown in command centers in the city, but you can put them on a 55-inch flat screen at the public library if you want to be transparent.

I am not saying that every citizen wants to know about 155 KBI, but they might want to know about the top six or top seven that will affect their lives, so you have the opportunity to do that as well.

In part of the spotlight cities you'll see the diversity there, and you have got Atlanta, Chicago, Dallas, and then you also have some research universities, Georgia Tech Campus environments are extremely important and function as many cities, and then you have Montgomery County.

Interesting there, you have got 81 miles of transit. It's not just a suburb of D. C., but the goal of the spotlight city project there is to actually allow us to make 81 miles of public transportation smarter to enable folks that are living in a lower cost-of-living areas to get higher paying jobs and better educational opportunities.

So, again, you know, there's three or four different smart city solutions that is rolled out within the framework in Montgomery County to help enable that value and, again, you know, the other five solutions of names and then within the solution of names you have products and services, solutions, if you will, that are actually deployable -- and the goal of the framework is deploy three to five of these to show that there's a holistic strategy that's in place and that the holistic strategy is better than purchasing one outside of those, because the data that you get from those three to five solutions has much more impact than the data you get from one, and that will drive more benefits to citizens in a faster manner.

The last thing I want to talk about is -- again, I started off by saying AT&T don't think of us as your carrier. Think of us as an innovation and technology company, and we do have a fully built-out innovation ecosystem, and this is where we add a lot of value to the ComEds of the world and others.

You know, we have a foundry system which are innovation centers throughout the United States. We have one in Palo Alto. We have two in Texas. We have one in Atlanta. We have one in Israel. Israel's focus is on on cyber security, Atlanta's focus is on consumer base and things. Plano is focused on the Internet of things and smart cities, and you can imagine Palo Alto is focused on everything, because that's where everybody 's doing different things and testing new technologies.

We also have health, and we haven't talked about health as being part of smart cities but health and education has a long-term benefits that can be driven by smart city deployment and extremely important. That's where we're working closely with research universities and some of the utilities and then, you know, we have got the University of Texas Medical Center and then a drive studio.

So we talked about traffic and transportation. We are working very closely with the different cities and states that have been

engaged in that smart city DOT challenge and we have a drive studio which is basically an innovation center for connecting vehicles that allows work to be done around vehicle to vehicle as we work on the infrastructure communications.

We have got 7 million connecting cars and expect that to grow to 10. We are working with 10 now of the top 15.

And just lastly I'll close with again to Brenna's point, and, Charlie, you know, we're working closely together with the city and with the state already. We are working with city leadership. We are working with the state leadership and the research organizations that are here, you know, like the work that Charlie's doing on behalf of the institutions we are working with together.

Interestingly enough, the flagship store that we have on Michigan Avenue, we actually will be putting smart cities solutions in there and our Smart Cities operation centers so that citizens can come in and see what's in the city and where some of the data is coming from and that may not be

necessarily the City of Chicago data. That could be from other areas just as a demonstration area, and then this is a major AT&T location (indicating).

So, you know, we looked at this. While Dallas and Atlanta may be our hub cities, I would say Chicago is the closest start and so we are very invested in the community here.

With that, I'll close and take questions if there are any.

MR. GEHRS: Thanks, Michael, very much.

CHAIRMAN SHEAHAN: Mel, I know we are running a little late on the time. I wonder if the panelists could just kind of quickly go through and point out either an obstacle or an incentive, something, some legal policy, regulatory barrier to innovation.

Is there one or two things that, you know, if they were to change, it would help accelerate innovation?

MR. ZETO: I think, you know, for us it's as an organization we all see down the road. We deliver value to our consumers and we want to do single trailers, so there are ways that we can work with

cities and pilots quickly and, you know, the City of Chicago has some things built in where pilots can be done, and that's great, because we can move faster.

We can also include in the pilot local companies that are innovating, and then I think you are starting to see the federal government draw some funding which I think will help drive an auction.

If you look at a lot of the traction that's being gotten in EEU, because the EEU has funded a lot of the smart city initiatives and projects that are related to smart cities.

MS. BERMAN: In our experience a lot of -- from our experience, a lot of -- we have got a lot of resistance outside of Chicago, even within the state, where we are bringing the data together to drive a lot of value, and we were always met with this policy don't let us share that data, and, frankly, when you finally get a lawyer involved, which drives a lot of expense for all of us, from the policy aspect, he doesn't say that. He just doesn't say you can't bring public safety data into other data.

FERC doesn't say you can't share educational data with other data sets or HIPPA doesn't say you can't share other data with other data sets. We need to be mindful of people's personal security and privacy of their data, but rarely does that bring about something. Rarely am I'm trying to bring a personal health record together with somebody else's personal record. We're usually dealing in the segregate.

So I think actually better education among our own staff, mine included, about our own staff about what those policies actually say can be extremely helpful so that when timing with other data sets from another government entity, whether it's across the county, or state, or even if it's another city, even internal as well, first thing is you can't have that data.

The driver should actually have to bring the value to our end customer, and we actually all have the same residents we are trying to serve, and what you'll find, in my past, you actually have to do extensive research on this one. A resident

seems to think we are actually sharing all their data anyway, our data team gives a piece of data to the City of Chicago, the county and the state, and public agencies as well, and that's a coordinated matter, and it's not.

Also, if you go and get this data from the state, and that means I'm actually delivering a better service and coordinated. Oh, yes, please do that. I would rather have better health care from a kid with a better educational outcome or better job services from a neighbor if you have that data together. So as long as you're delivering value, most people are actually okay with you sharing that data.

So I think better education around what the data management policy do say is helpful and then making sure we either streamline those policies or don't impose new policies in the name of cyber security. I'm all for cyber security, but they don't require a stronger data management policy we will go a long way to making sure we bring the data together that's going to drive value.

MR. CATLETT: I couldn't have said it any better. Just in response to the access to a data system, it's important for us as a nation around universities to help utilities and other providers to do a better job, and we run into data access which is almost at every single project, so you have scientists that could be helping or to understand going to meeting after meeting trying to convince some entity that they should share their data even for their own benefit.

DR. SHADIDEHPOUR: The biggest obstacles that we see is a lot of times the lack of objective in the sense when you develop initiatives and innovations, who's going to benefit from that?

I gave the example of a project in Africa. That's very clear cut in the sense the project is moving along very quickly because we can see the tangible benefits of developing that, people who are going to be saved, basically their lives are going to be saved.

To some extent here I think we have to identify certain projects and certain innovations

that we're going to redevelop and sort of have certain objectives as to who's going to benefit from that. I guess in the case of ComEd, the fact that identifies a certain number of microgrids and their objective to develop those and sort of identify the benefits that are going to be afforded to customers in developing those microgrids, define objectives and innovations that I think you're going to see the world continue being developed.

MR. GEHRS: Just maybe two observations. I've traveled across the United States to different utilities. I see a bit of a difference between vertically-integrated utilities and disaggregated utilities, because, as you know, in Illinois there's other states where generation is separate from distribution.

So if your generation is separate from distribution, then you really need an incentive to encourage efficiencies, especially on the grid.

If you're vertically integrated, there's much more incentive, so I can see regulatory assistance and incentive encouraging programs such

as conservation voltage reduction, which is a good program, reduces energy use, but it's expensive to implement, so utilities really need an incentive economic to do that.

So I think that's short-term. I think I need a little longer out. The question is how do you leverage this whole public and private nature of the communications networks.

I think we have talked about that, and we are still talking about that. How do you leverage it to be used for both apps, and then further out what is the business model of the future of utilities? What do you expect them to do and how are you going to structure that?

MR. SOUTH: That would be this issue of what's called valley of death, which is you can take technology up to a certain point and oftentimes we can't scale beyond that point because they don't have the platform to test them in a broader environment.

COMMISSIONER ROSALES: I'm sorry. What did you call it?

MR. SOUTH: Valley of death. It's where the technologies go when they die. They start out as an innovative technology that's tested at the lab, but it never gets to the community market where it might have value because it does not have the ability to take it from the scale, which it has been tested, the laboratory scale or pilot, to the market and really see how it deploys.

ComEd is doing that now in Bronzeville with the number of technologies, but we need more examples of that so that a full spectrum of technologies can be tested, vetted, the data streams and values with them quantified so the business case can be associated with them and they can then go to market.

MS. BLAISE: From a utilities' perspective, a lot of what we are doing today are things we have never done before. We are testing different models, different solutions for customers, and it's not always the existing regulatory model.

So what we would need really we like an ability to test out more without the risk but

that's something we need to kind of work through. How are we able to test new solutions for customers, utility solutions, partner with others, because we are going to need to do more and more of that as we move forward.

MR. GEHRS: Well, I'm mindful that lunch is waiting, so thank you all very much. Would you please thank our panelists.

(Applause.)

CHAIRMAN SHEAHAN: We will reconvene at 1 o'clock.

(Whereupon, a lunch break was taken.)

(Whereupon, the proceedings commenced as follows:)

Okay, welcome back. We will get started. Thanks for hanging in there with us. We have one last session. Panel 3 will discuss the utility's role in building smarter cities.

To lead our discussion, I would like to introduce one of my two legal and policy advisors, Elizabeth McErlean. Please join me in

welcoming Elizabeth and our third panel.

(Applause.)

MS. McERLEAN: The energy infrastructure is a vital functional entity of this city and its utilities are uniquely positioned to enable and to accelerate the growth of smart cities.

Utilities can leverage key strengths, meaning energy, delivery, infrastructure to power homes, businesses, and operating systems and wide-ranging efficient networks that play a temporal role -- a temporal goal in the emergence of smart cities.

This panel is intended to discuss the strategic approaches utilities can play in leading roles in building smarter cities and smarter communities.

The format of the panel will consist of a brief presentation by each of our panelists followed by a series of questions.

Any time remaining at the end, we'll take questions from the audience.

Before we begin, I would like to

introduce our panelists. First, we will be hearing from Joe Svachula --

MR. SVACHULA: Svachula.

(Laughter.)

MS. McERLEAN: -- Vice President of Engineering and Smart Grid at ComEd, and then we will be hearing from Mike Abba, Director of Smart Grid Integration and System Improvement at Ameren Illinois, then we have Michael Britt, Vice President of Energy Innovation at Southern Company; and we have Russel Ragsdale, Principal Manager of Grid Modernization at Southern California Edison; and then we will be hearing from Bill Abolt, Vice President of Energy at AECOM Technology Corp; and we will be hearing from Susan Satter, Public Utilities Counsel at the AG's office.

Please join me in welcoming our panelists once again.

(Applause.)

MR. SVACHULA: Our name has lots of benefits, you probably haven't heard of. So when people hear it, they're like I know your brother. It's also great

when telemarketers call.

(Laughter.)

So I am Joe Svachula, Vice President of Engineering and Smart Grid. I know you've heard earlier from Jennifer and Michelle. I will try to take you through a little bit of what we are doing and I'll maybe be a little more technical and a more tactical level.

I would like to start off with this slide as I talk smart cities. I think it just paints a good picture of how we view smart cities and what is meant to say is that everything in the city becomes connected, and the lines represent the networks and the communication that's starting to grow.

We have got all of our meters, all of our DA switches talking to each other, and that mesh network will go into northern Illinois. That mesh network has capability and capacity.

So one of the questions we ask is how do we share that in a way that benefits and provides added value to our customers? Some of these

applications are starting to come in bubbles so our customers might benefit from.

You've heard about streetlights, AMI water meters, and EET charging stations connected to the grid, so lots of visibility to the grid, lots of data that starts to come back to us.

We need data to run analytics we now know is going to be more and more powerful, which means the data that we have been able to use for power in a distributed way and this network is starting to provide that.

In the bottom, one way to think about smart cities is in the context of improving liveability, improve quality of life with the applications, work ability, can you help with economics and create jobs; and then sustainability, is it in it for the long haul; does it include the citizens there. So liveability, sustainability, workability are key lenses that this is used around the country.

We have done some internal benchmarking. We have also gone out and talked to a

lot of companies, both in the U.S. and around the world, about what they can do in smart grids -- a smart city space, and the themes that are starting to emerge are in those gray boxes.

There's six themes of very successful smart cities. The first is that they have robust communication strategies. They have a vision. You want to see some good, you will see Seattle listed. Visions like Seattle, they have a nice framework that lines up all the entrepreneurs and innovators. Empower Charlotte, they have got the same, so there is no definition of smart cities, but people have a vision to get a little bit more traction.

The next is focused on consumers or customers. You have to bring them along. People don't know the problems, they have to reach out and understand those from the customer.

Partnerships are huge. We heard the concept of an eco system. There's no one provider that's going to fix all of the stuff, and the problems out there, they are about an ecosystem.

It starts with universities and

national labs that include utilities and telecoms, and it include innovators, entrepreneurs. They include energy. It's all of us that are a part of this ecosystem.

Funding has also been a theme. Successful private-public partnerships are prevalent in the most successful models, and then visionary and progressive leaders are important, and then the utilities I think are uniquely positioned, cities, municipalities, leaders could be a little more transient, and one person's vision can change today and tomorrow, but one of the concepts is that longer term vision is a little more successful.

We went through it and we said what would be the major categories of the buckets of smart city applications? There's two main categories: Infrastructure and then services. We wouldn't think ComEd would play in all of these.

Under infrastructure, there's mobility. Obviously, electric vehicles is a common area there. Public transportation is another area. Construction and buildings, we think that energy

efficiency, smart buildings are a place ComEd would like to be, energy, obviously waterway management, and then on the city side public administration, services.

The city tends to be a little bit in cycles, so how can you break across those cycles? Some of the smart city applications are turning a lot of traditional mapping into three-dimensional underground maps.

There is a whole bunch of real estate untapped below the city's buildings, and that can be eventually viewed as real estate. If you want to be in prime property, you ought to see the cities around the world are starting to put maps together, to bring all the services together on one map, and take all the maps and digitize it in all different departments, and bring it all in one platform; health and safety, we hear a lot about culture and education.

On the bottom there are eight examples of initiatives that we think make essential common microgrids, solar and storage, demand response,

smart streetlighting, EV stations, charging stations, I should say, energy efficiency, building automation systems and rescue polar energy management systems.

I think we heard a lot about streetlights today. I won't go into this, but I would say what's important with this when we do talk about pilots we went out and talked to the towns in Bensenville, Illinois, and Lombard, and we talked to people that operate these smart streetlights, their comments surprised us a little bit.

Some of the functionalities you can do to save energy. They weren't so interested in that right now. They wanted to go slow with that. They were worried about maybe something popping up with their streetlights. They said we really love that you let us know the streetlights were out. We didn't know that before, and we also don't have the best records in municipalities.

So when our customers call us, we can look at the report sheets and messages you send everyday and we can know that you are going to be

out here to fix this, so, you know, you can tell our customers, and if it's not in your report, we know there's a municipality that will be on the streetlights, but they won't have those records and they're saying we would expect that you would provide that as a sort of service.

We're still working with them. We're up to about a hundred percent of licensing and we're doing a pilot. We we're doing pilots, and there were some issues going on, but we're ready now to start sending servers to the other municipalities.

Lastly, I will close on a slide about some issues that are taking place around the world. In Amsterdam I think is similar to what Charlie Catlett was talking about. They're starting to put a lot of air sensors on year-around, CO2, NO2, other types of emissions. Utilities can provide poles, transmission towers, access up in the air in good spaces for a lot of these sensors.

In New Jersey, gunshot detectors are starting to proliferate, so you can know that detectors that can hear the frequency of a rifle or

a gun triangulate and immediately dispatch 9-1-1 to locations that are pretty exact to where the gunshot took place.

Boston is putting sensors in waste management systems so they can detect in the sewer that if there's viruses, that there is disease, and they can find out ahead of time before an epidemic strikes.

South Korea is starting to move to a garbage system based on weight and garbage container control, and there are a lot of systems in the U.S., are just actually on kind of a time-based cycle going around to collect garbage, which you can make garbage collection a lot more efficient when the garbage cans are actually full.

San Francisco is putting cameras on the streetlights. You have got parking applications. You can tell people through apps that there's parking spots are open which decreases double spacing. You can also see that a car hasn't moved and law enforcement that there's a ticket cheater or perhaps if for some other reason a has

has been parked there for a long period of time.

And, lastly, Singapore is starting to use a lot of these network devices that drive intelligence into street signal outages.

So I thought those were very good examples of what's going on around the world. I'm not saying that ComEd wants to be in these spaces, but it is a good example of this stuff that is just taking off and there's a lot of opportunities. Thank you.

MS. McERLEAN: Thank you.

Any questions from the Commissioners or the Chairman?

(No response.)

If not, Michael.

MR. ABBA: Good afternoon, everyone. Thank you to the Commissioners for allowing us to make this presentation today.

I'm Mike Abba from Ameren Illinois. I have been involved with the Smart Grid in Illinois and Ameren Illinois for about seven years now, so I have seen a lot of people dealing with over the last

seven years. I appreciate being back here with you.

I want to talk about -- and anything that I am going to say, I'm sure it's not something you haven't heard already in the two panels this morning, but I want to put a little spin on it from an Ameren Illinois's perspective.

Just some foundational context, you know, we don't have a city the size of Chicago that we serve in our territory. We cover the bottom two-thirds of the state, about 44,000 square miles of territory. Our largest municipality is Peoria about 115,000, and we small service towns with hundred 1200 meters.

So our communities' needs are a little bit different probably than Chicago's and we think foundational things, smart city applications, just having that relationships -- basic relationship with all municipalities we serve. Once you have that and you can build on it, and we believe we already have that, so we think foundationally one-size-doesn't-fit-all, so you have to to know what the needs of our cities are and build from

that.

With that being said, I think you've heard a lot of these things already, but we see at least five key roles that utilities can play in building smart cities.

The first I think Commissioner or Chairman Sheahan mentioned in his opening comments we have to provide reliable service, and Ameren, Illinois, being both gas and electric utilities, we see both of those services have to be reliable.

From an electric perspective, that involves adding infrastructure, making sure you are safe, and we have faster capacity, we need distribution generation automation that we are doing through EIMA. It's leveraging efficiency in our network, moving toward and making voltage bar optimization, CVR.

But it's also part of having that relationship with communities and ensuring during emergency situations we are working with them, we have contact with them, we are glued to the hip within regular situations.

We have most of that in place in our communities. We have foundational, but we are leveraging our technology to ensure our customers are aware of outages and our communities are aware of the outages, the restoration time, and how we can best work together to restore power.

When we think longer term, we start getting into, as I mentioned today, how do we integrate more distributed energy resources on the system.

For Ameren Illinois, I think we only have about 500 metering customers now, somewhere around there, so it's not a whole lot yet. We expect that proliferation to increase over the next few years. We need to develop the capabilities, as Mel was talking earlier about technology, and you have got to really prove point NASA and you've got to build that capability within your own system.

We need to start building capabilities because we know it's coming to integrate and distribute energy resources on our system, to be

able to operate them and control them in a way that ensures our reliability but also allows economic operation, and that's first and foremost.

Once you go beyond integrating distribution energy resources, you are beginning to look at what ComEd's been looking at on the microgrid side.

I want to make it clear, at least in our mind, that that's a big step to go from just integrating resources on a grid to moving to a larger grid when you take a different type of generation asset and a different whole set of controls.

So that's really a big step that we need to learn how to be able to do that. Whether we're actively on generation or put on that side, we have got to maintain the integrity of our system to be able to manage that, so we have got to learn how to do that and have enough control over those assets to maintain our system.

So, you know, the other thing, since we are a gas utility as well, we think that natural

gas will play a role in that business. Odds are that the prime mover in those microgrids are going to last several days, if need be, or several hours. It's going to be natural gas-powered devices of some sort.

So, you know, Joe mentioned the technology challenges you have when you are talking about microgrids. Technology is going to be hard. I think the hardest part -- you know, Dave Kolata mentioned earlier and two of the other panelists did, the economics, how do you fairly compensate people for those services? Who's paying for it? And what that business model is -- model is probably just as complex and more challenging than getting the technology right.

The second piece that I think people have already mentioned is the utility's role in leveraging the AMI system we already have in place. We are celebrating our historical implementation of 62 percent required by the IEEMA, so we will complete that in early '18.

We are strongly looking at the

possibility of going to a hundred percent AMI as well, so we are leveraging that system.

Since we are already doing the utilities, we have already got the electric and gas meters in the system and so our customers are already on that system, so it makes sense to look at -- as Joe said, to look at water systems, to look at other municipal systems that can leverage that same technology that's already in place to improve the life of the system and their community.

Tied to that closely, you know, with our Smart Grid deployment and AMI deployment, we are building a communication network that people will need to fully operate our system, expanding our fiber network, our mesh network. At some point that should be available for others to leverage as well, and if the infrastructure is there, we need to leverage it for other uses as well. We need to find a way to do that within a regulatory framework.

The fourth item already mentioned, we see a good future with LED lights and the next LED lights and the amazing technology apply using that

platform, we are looking strongly at trying to start pulling out LED lights in the near future as well.

And then, finally, I think everybody's talked about this already is support of electric vehicles, I think everybody in this room believes electric vehicles and, from our standpoint, possibly compress natural gas vehicles are a good benefit to our communities and our economy. We need to support those as much as possible.

Utilities like Ameren Illinois needs to ensure we have a system in place that we can readily charge those, and then we support the adoption of those, and we need to think about what else utilities can do to help incentivize people to purchase those and proliferate those as well, whether it's being incentive ways that we can incentivize our larger employers, charging stations for their employees, or either areas that maybe utilities should be installing charging stations underserved area or in key transportation areas, so I think that's up for discussion as well.

So, finally, if we think about those

things, what are the regulatory models for consideration, I think all these we have talked about already. With distributed resources, with energy efficiency, conservation voltage reduction, there's going to be a loss in revenue or revenue to a utility. How do we deal with that? How do we make it so utilities are at least neutral or maybe incentivized to help support those.

Data integration of distributed energy resources I spoke of are going to require more different systems, maybe different ways to look at a business model. The ability to leverage our existing infrastructure to provide other services is kind of a gray area. Some of the regulations now we need to protect, and in this whole idea of how can we proactively incentivize people to promote electric vehicles and alternative technology.

So we are really excited about discussing this time with all the stakeholders in Illinois. We believe that the future is bright.

When I look back -- I have been involved with this for seven years with the Smart

Grid collaborative, and I have looked at Chris and Dave and some of the other players in the room, good discussions over the last seven years certainly wasn't always easy, but we managed to get through it and we are much better off now for those discussions and we are anxious to continue those, so thank you.

MS. McERLEAN: I just have a quick question before we move on to the panel.

I think you both talked about leveraging the AMI and mesh network energy management. Can you explain -- I think there was also a lot of talk about streetlighting, gunshot detection, in the existing AMI mesh networks that, you know, is creating the smart grid capable of supporting services such as those?

MR. SVACHULA: The way we answer that is the network is built to be robust for reasons like today with all the wind we are going through, so as the equipment gets knocked down, it can reconfigure and still communicate, so there's capacity that's built in for that reason.

On blue sky days and other days the

way I would characterize it is that the existing network can handle a small jerky types of communications. It's not meant to stream video. It does not work like Broadband, so it would work fine to talk about control communication and to talk to AMI gas meter.

What you have to do is at some point is scale up, but think of it in terms of short bursts of information will work perfectly fine and a whole bunch you want to start just streaming with video and things like that and those types of applications.

I would just have one caveat today is the research at Silver Springs continues to evolve, so I see a lot more capabilities in the future.

MR. ABBA: Ditto.

(Laughter.)

The only thing were commented earlier that Mike had called it the perfect platform because electricity and likely had some form of communication, so that why it a perfect choice to start building from leveraging that same

infrastructure. Joe said not every application will work on an existing communication network.

MS. McERLEAN: Thank you.

Michael.

MR. BRITT: Thank you. Hi, I am Michael Britt with Southern Company. I'm going to talk a little bit about the role of the utilities, but before I get there, I want to thank the Chairman and Commissioner for the opportunity to be here.

This topic is really a critical one, and this Commission is to be commended for carrying forward not only this session but the infrastructure or Smart Grid Law you passed in 2011, 2012 is one of the best infrastructure rules that exist in the country.

Illinois and Virginia are sort of one and two in my analysis of the best rules out there, so you created the kind of environment that supports the grid. And when we talk about smart cities, I think the foundation of a smart city is reliable energy and reliable communications and data.

So I think about those things as sort

of the air and water that makes all the other innovation possible here, and so you created the environment to permit that growth here in the city. It's already a hub for innovation, but having this kind of infrastructure, ComEd and Ameren are to be complimented for the work they have done to continue to drive that forward.

I think that is an important step in this session. How do we go beyond that? How do we think about what else might need to be there for utilities to play a bigger role in helping making this a reality.

I am the vice president of Energy and Innovation Center at Southern Company. That means I'm not the source of the innovation. I'm the source of the catalyst. I'm really one of 26,00 employees in the company. We are privileged to serve 4-1/2 million customers in the southeast, Georgia, Mississippi, Alabama, Peoria. Those customers are at the center of everything we do.

When we think about our strategy for smart technology of any kind, it really starts at

the helm with the customer and connect homes moving on to connect to the community on out to a connected to the smart city.

So we see it really starting with the individual citizen solving a problem, at its heart is really what it's about, but what we see is a key change.

If you think about what's happened in technology the last few years -- I was at the Consumer Electronics show in Las Vegas a few months ago, and what was interesting was a quarter of the show place was electric transportation. One-quarter of all of CES was electronic transportation.

Another component of it was everything is a computer, everything. Everything can't be a computer. The cost of Morse Law all the other technology development is making it possible for literally -- it's not the Internet of things. It's the Internet of everything, and what is the weird -- what should be something that's monitored, and what is something should be connected and part of the city, so we think this is an important next

discussion, too.

We actually asked the center to do a quick look around the world at where some opportunities might be for utilities, what role do utilities play, and they found it most of the utility-led efforts were really focused on energy and stopped at the water's edge.

If they went beyond the traditional grid, it was around mobility. It was around transportation, things like that, and then if they went beyond that, a few utilities were involved with open data communicating and helping to digitize information out in the community.

We figure there's a much bigger role. Let me share a little bit about making a framework that they helped share with us. We think it's kind of interesting, but if you start again with the citizen at the center, what problem you are trying to solve, if you have a core strategy for your effort, what is it you are really trying to get done with the smart city? And it isn't just Chicago. It won't just be a smart city. Smart cities will

become the norm, and then what's next? Right?

What is it you're really trying to address: Public safety? Health? You know, the health of your community? What is it you are trying to do with this smart technology? Because there is enough capital to go to deploy everything and make everything smart, and the reality is if you deploy capital that way, what ends up happening is you have an inefficient deployment, because then your whole network is the same vintage and, therefore, you don't have the ability to keep up.

As soon as it's deployed, it starts to get obsolete in this world, so actually having a fresh approach of what you are trying to get done in terms of what citizen issues you are really trying to address. What problems are you trying to solve with this?

We think that's an exciting opportunity, and how do you structure it? What kind of governing structure do you have, because it's going to take public-private partnerships. There isn't enough money in the tax base. There isn't

enough money from corporations to try to put that all into one bucket. You have to try to figure out how do you actually organize something like that, and then how do you create an environment for a test bed where you can get smart innovators working with this public data, working with technology to begin to create a future for the city, so API can write to data that they can gather where they can develop an app.

You know, probably nobody in this room would have developed Uber because it kind of flies in the face because it's a regulated service. Cab drivers, and so forth, you know, they pay for that medallion on the taxicab, and so suddenly Uber pops up. Uber pops up because technology where it's possible to ride share, and to communicate, and sort of create an individual one-to-one, peer-to-peer transaction, and so those things start to happen creating an environment that allows more of that innovation in cities is important.

Next is sort of how do you roll all of that out and integrate it all? There's a lot of

different pieces in that part, and how you tie them together, and then how do you manage that?

So it isn't that the grid was smart. I think that was a comment earlier in the prior session. It was really -- it isn't that the grid is smart, it's that the people are smart or the machine communication that takes action on the edge of the network is smart. That's where the opportunity resides in the management of it.

So we really see utilities can play a role across the value chain, and, again, that's something where if there's interest in having utilities involved in multiple areas, then we think there's a logical role.

So Mike Zeto on the prior panel shared a bit about smart cities alliance, we joined together with TGE, AT&T, SYSCO, Ericcson, IBM, Deloitte, and others, and it's really focused on smart infrastructure, how do we take the vertical asset. We have got all these poles and streetlights.

Utilities traditionally have usually a

whole lot of the vertical tower. How do you make the most of that? And then we have a whole lot of horizontal assets, things are underground, conduit, vaults, where sensors and so forth can reasonably be placed in places where infrastructures come up out of the ground, manholes and vaults and things.

So those kinds of opportunities -- there are the opportunities as infrastructure or city work happens where you could pre- -- while cities are tearing up a particular street, you should be installing fiber. You should be pulling that fiber to the street lamp.

Do you know exactly what's going to be on that lamp in five years, ten years? I guarantee you it's going to be a whole bank of sensors and smart stuff that's making vehicles and traffic move more efficiently through the city, because it's about moving goods and people through the city more efficiently. That's where the opportunity will be, and then --

COMMISSIONER ROSALES: Sorry to interrupt. What if that becomes obsolete?

MR. BRITT: It will, and then what you want to have -- great question. You want to have -- the fiber won't become obsolete, but what will become obsolete itself is on the end of it. So you want it to be modular where you can remove that and snap any sensor pack in, so you want to buy an overhead light that has sensor packs that can be upgraded so as that sensor changes and the capacity what you are looking for might change, but the interface would stay the same to the head power interface and beyond that. It's what the capabilities of an array of sensors that you have there, and the cameras will continue to get better and better, so you want it to be the kind of thing that can be upgraded either soft upgrades or firmware, that kind of stuff or hardware, but it's a great question.

And then the control side and early sustainability, this is another thing to think a lot about. Food (sic) doesn't serve a big problem and where and how can you take advantage of two issues. One is abandoned buildings or underutilized buildings and facilities in downtown urban areas.

Could they be turned into inter-agriculture to grow lettuce, and fresh fruits, and vegetables locally? They're organic. It's also an opportunity for new jobs and an on-ramp for jobs.

We're working with the City of Atlanta, and a new urban agriculture leader, to support a program called Let Us, and Let Us is an on-ramp for jobs. People who have been long-term unemployed are given an opportunity to start to work in urban agriculture growing lettuce in an agricultural environment, things like that. So there are opportunities to tie together in all forms of sustainability connected to communities and connected to cars.

So all that together we see as important pieces. I'm just going the wrap up my comments.

MR. RAGSDALE: My name is Russ Ragsdale. I'm the Principal Manager of Grid Modernization. That's in California. Thank you for the opportunity to come, and speak, and learned quite a bit from you all. I really enjoyed this morning's session and just hope

I can contribute a little bit to this.

I'm going to basically talk about what we are experiencing in California, a little bit about utilities and what we're experiencing talking about how we are responding to that, and some of the plans that we're putting into place, and then some thoughts about how we can leverage that into smart cities and some regulatory implications.

So Southern California Edison is one of the, you know, three big utilities there in California, serve about 5 million customer accounts, over 190 cities and counties, 50,000 square miles of surf, service territory ranging from beach communities, like New Port Beach, Huntington Beach, the desert communities like Palm Springs, Victorville to rural communities like Death Valley Mammoth Mountains, and then all of the interconnected LA suburbs and communities, and a pretty wide variety of customers and distribution system configurations that we serve, a lot of infrastructure, over a million poles, a lot of transformers, a lot of transmission distribution

lines.

Big things that are happening in California, which I'm sure many of you are monitoring, is the penetration levels of distributed resources that we are facing.

We are processing over 5,000 applications per solar portables per month. We have installed approximately 160,000 rooftop solar throughout the service territory for about 1255 megawatts which at peak is still less than 5 percent. It's totally around 22,000 megawatts, and if you have look at the solar output at time-of-peak, it's less than 5 percent but still is representing in some areas pretty high penetration levels.

Also, in California currently we have energy storage mandates. There's 1325 megawatts throughout the state, and our portion of SEE is mandated to procure 580 megawatts of energy storage by 2025, and we're allowed to own up to 50 percent.

Also, recently we filed a charge-ready application with our commission that gives us the

ability to this year install 1500 electric vehicle charging stations throughout our service territory. This structure basically that's stepped up on the customer side of the meter and allows charging companies to come in and deploy structure, designed to stimulate electric vehicle options and it really promotes low greenhouse gas emissions.

So looking forward, I just wanted to highlight some key things that we see on the horizon in California. So recently, and this proceeding is still ongoing, the utilities filed their distribution resources plan in July of 2014. This year we will be going to workshops and our commission will reach decisions. That proceeding is really around integrating distributed resources into planning and operations of the utility.

The commission asked us to find a set of methodologies and tools so we did an analysis called Integration Capacity Analysis where we created some publically-available maps of all 4600 of our distribution circuits, had developers go in and look at the circuits and see what the

capacity is for distributed resources.

The way in which we display that is we find a consumption and a production limit and, you know, as we understand there's different types of technologies out there, storage, solar, solar energy efficiency, demand response, electric vehicles resources and you can combine them and put in the roadway and then they could have a different impact on the grid.

So we want to kind of set some sort of guardrails and just kind of signal to developers that where it's likely that there will be some significant affect to the grid or under certain limits performing that analysis, and the commission still hasn't fully decided on what this specific analysis should entail moving forward, so we still have some opportunities and flexibility to tweak it.

Also, as part of that proceeding, there's five demonstration projects that are highlighted to test out benefits that can be achieved by distributed resources. There are locational net benefit methodologies looking to

evaluate what are all the benefits in addition to energy that these resources can provide.

Can they defer capital investment? Can they provide value in the voltage and power space? Are there additional market benefits they can provide?

We are looking at what all those are compared to the cost for distributed resources, and then also try to pilot what is the technology needed to enable these resources.

Recently in October 2015 the governor signed Senate Bill 350 which requires that 50 percent of our energy comes from global resources by 2030, and we are still working with the specific guidelines of that, but definitely a forward-looking target, and we see that the penetration level of renewable resources in California is going to continue to go up.

Up until this point, distributed resources of which I believe sat not counting towards FRDS, so 50 percent of energy renewable resources may be -- may drive large central station

type of renewables. That's in addition to all the distributed resources that you are seeing.

Microgrid is becoming -- I don't know if you call it a fad or just an increasing level of interest in California, so we have many customers asking what are the capabilities for utilities to come in and install or operate a microgrid. Primarily for resiliency purposes, many of the customers are military bases or military establishments that end up being kind of key areas in alerting to response scenarios, but some of the high-tech customers are inquiring about microgrids as well.

So, as a utility, we are in the process of evaluating and trying to determine what is, you know, the criteria and the mechanisms by which we can support these customers needs and development to deploy microgrids, you know, based on what their needs are and does it become a single customer funding microgrids? Are there opportunities to benefit multiple customers when deploying microgrids? Are there opportunities

involving grid resiliency concerns around microgrids?

We are still investigating all those different criteria that should be used but definitely it's an area where we know customers are interested.

So the Distribution Resource Plan asked us to integrate distributed resources into planning operations, and up until this point we really haven't integrated distributed resources. I would say we have accommodated distributed resources.

So an application comes in and, as a utility, we evaluate what is the impact going to be on the grid and we make sure we do what needs to be done so that doesn't screw up the grid. It doesn't create any negative impacts to other customers. It doesn't create any overloads to the equipment or infrastructure. We make sure that it can operate, but we haven't really looked at how can we leverage these distributed energy resources.

As new tools in a tool belt, we need

to look at that. When you start to think about that, we realize that there's some capabilities we need, as a utility, that we don't have today in order to deal with it, and we really buckled it down into three categories: monitor, predict and control.

We need to have the granule level of information on the grid to understand how these resources are operating and what they're producing at a very granule level. Today we have data -- day-to-day date that we get at substation level. We also have AMI data throughout our service territory.

If you look at any point on the grid on a real-time basis, you don't really know what is your real load at those locations.

Our distribution system is very dynamic, so the reason knowing the power tool along the grid is important, because we are on average reconfigure distribution probably over a hundred times a day. That's because of maintenance activities. This is because of abnormal outages because the line goes down, because of those activities, we have a need to maintain a very

dynamic nature on this solution.

If you fast forward to the space where the grid itself is being supported or relying on a combination of solar energy storage to meet those customer needs, now you want to reconfigure the grid and move that solar energy storage to be fed from a different direction and different feeder, it becomes a very complex proposition. It becomes beyond what we believe humans can intuitively discern.

So we believe that there needs to be technology and analytical tools supporting that human decision-making, and we talked about this earlier in the day today, really having the data available and having the tools to process that data is going to provide our operators and our abilities to operate the grid is going to enable us much more capabilities and enable us to be able to leverage the resources to meet the needs with a very unique problem operating at a smaller margin but then still allows that flexibility to maintain reliability to our customers.

So what you are looking at here is a distribution feeder and what we are showing is in order to get this granular set of data, you could deploy a whole bunch of new sensors along the grid, but we think the most cost-effective way to do this is to leverage the technology we already have on the grid, like our automatic switch infrastructure, like our substations themselves but augment that technology with additional sensors, with additional data-collecting devices, and to me it becomes kind of like a cell phone.

Today your cell phone -- probably the least used function on your cell phone is making a phone call. You use it to get data. We think the same thing is going to come true of utility grid devices. The device will still switch but in addition to that it will also give you data which is going to be very important to being able to operate the grid.

There's going to be communication infrastructure needed to support this as well. Today we have an AMI mesh network. We also have an

network which is potentially a 20-year old technology, a different mesh network that operates on solar RF frequencies that technology does not have the bandwidth or the capacity to support the amount of data that we need, so we are looking at replacing this aging infrastructure with new energy.

When we think about how we should do it, and what it should include, and what the capabilities are, it opens up a lot of opportunities to what was discussed today. How can you leverage that new network, not just for your grid devices but also to support your AMI structure, also to communicate with the distributed resource, energy storage, and PV and ask devices to charge or discharge, maybe also support our utilities. So there's a whole wide array of possibilities as we start to think about infrastructure that's needed.

I mentioned the analytical capabilities to support. You have to have a set of tools that can leverage this data and turn it into information. So having a lot of data is great, but

if you are not able to take the data and turn it into useful, simple information for operators, it's not valuable. So that's the other component, but let's get the devices out there, collect the data, create a telecom network to be able to transmit the data and create some tools, so, as I mentioned, there's opportunities to leverage this.

So one of the areas that is maybe too simplistic, and that's why it wasn't mentioned earlier today, I think there's opportunities for us to partner with cities and counties just in terms of our financing, just in terms of thinking what is the long-term vision for a given city or given community and how does that align with where the utilities are going in terms of load growth, in terms of energy, in terms of resources.

I think there's a lot of opportunities for us to have those conversations and align on where we are going. Different cities, different counties have different objectives, and, as utilities, you know, we have our traditional processes by which we forecast and try to meet those

objectives, so being able to better align is where the cities and counties, where representatives and customers, are going I think create some optimal ways in which we can plan for system expansion and then focus on resiliency.

I mentioned microgrids. There are places within cities and counties, customers, fire, police, hospitals, they are more critical than others, so being able to understand where those needs can help us to drive resiliency to help us to focus.

I mentioned investments in telecom space, and we've spoken a lot about street lights. Regulatory support is necessary in order to make this all happen, and one of the areas that I heard throughout the day today that everything is critical is understanding what is the objective of creating a smart city? What is the objective of deploying cool technology? Is it just because it's too cool or are we trying to act in opposite?

So understanding that, being aligned on that, having the commission that's aligned on

that, having the utility that's aligned on that, and understanding where the customers are trying to go can be very powerful, and so we think that that's something that regulators can help with, but also utilities opening up communication lines, listening to what customers are saying can help us get there, and understanding the benefits and the risks.

If we are going to deploy infrastructure, what is the ability to recover on those costs? What is the value that we are providing the customers?

So understanding how that whole equation plays out is important to utilities in wanting to support this effort, because also in understanding that downstream, we also want to be mindful of customer fairness.

We serve many cities, different cities, a few different kind of communities. Some cities have more affluent population than others. So when we are deploying smart technology, are you deploying them in these cities that have more affluent population at the expense of everyone else?

We kind of see this in solar deployment in Southern California, so it's just something to be mindful of. We don't want it to be an obstacle for doing this, but, as we move forward and start to look at areas where we are deploying technology, are we going to make sure that it's available or beneficial to all, and then, of course, you know, the regulatory concept can be based on the market. Technology is moving very quickly. Vendors are moving very quickly. They want to jump into the space and ready to deploy and have a lot of abilities out there, but are there tariffs in which we can play in that space and make sure that it has value for our customers.

This is an exciting time. There's a lot of opportunities out here for everyone, and we are really looking forward to seeing how this growth progresses in the future.

MS. McERLEAN: Thank you.

MR. ABOLT: Good afternoon. My name is Bill Abolt. I am Vice President with AECOM Counsel Corporation. We really appreciate the opportunity

to come to talk with the Commission and the public about some of the opportunities and particularly the roll of utilities in smart city accelerated deployment. I want to cover three things today in my remarks.

First, I want to tell you who we are at AECOM just to provide a little context. Second, I want to talk a little bit about the central role of energy in those smart city plans and the value that we have seen in countless incidences of utilities in collaboration and accelerating smart city adoption, and then I want to spend some time talking about the barriers and opportunities to smart city progress as we have seen and encountered.

First, AECOM is one of the world's leading providers of analytic (sic) solutions. We plan and design cities, communities, and neighborhoods, and we design, build and operate the infrastructure that they depend on.

Our experience ranges from we are currently preparing one of the first comprehensive smart city plans under the agreement with the U.S.

Government and India to accelerate smart city's deployment in vastly urbanized areas throughout India.

So we have provided a variety of resilient and smart city solutions from traffic management, to grid integrated solar, to critical resilience infrastructure programs, from everything from data centers of the federal government to critical facilities in major problem areas throughout the United States.

My background, prior to joining the private sector, I spent my time in local government. I have lived in the City of Chicago where I was responsible for the oversight of the city's relationships with its utilities, and then as budget director and chief management officer, I was responsible for the city's operating budgets, as well as its capital planning process.

We don't really have to spend a lot of time defining what a smart city is. I don't think that's essential to this discussion, but I do think from looking at smart city plans and initiatives,

whether they're driven by a utility, or a government, or a private entity, looking at those plans from around the country and around the world I think are instructive, and I think there are particularly five things that a lot of those plans focus on that are relevant to the discussion today.

The first is the central role that the energy system, in particularly electric infrastructure, plays in smart city plans. There is not a plan out there that doesn't have its central to it, and there are very few plans that don't lead with energy, in particular with electricity, and whether that's focused on a significantly increasing resilience or extending the benefits of cleaner energy to communities and to neighborhoods in need.

The second observation is that most of the plans also quickly follow with a focus on mobility, and a big focus on mobility, a central element of that is electrification of vehicles and the development of supporting infrastructure that makes it possible, so a clear nexus between the electrical infrastructure, electric system and other

infrastructure that operates within the communities.

A third consistent theme that you see in these plans when you look at them is a clear focus on leveraging of existing electricity infrastructure to achieve smart city objectives. That's why we have been talking about streetlights and smart meters.

I am wide open to the discussion of how smart meters, how electricity and the capabilities in start thinking about smart water meters.

The fourth clear thing that we see over and over again is that most of the current and near-term applications for smart cities have a very significant intersection with the public interest.

So while there's a good deal of discussion about the private business opportunities that will emerge from this smart city, the things that you lead with are primarily focused on public interests, energy infrastructure, enhanced services, you heard from the City of Chicago and others today, and those enhanced services are generally focused on

what we would categorize as public goods, things like public safety, critical infrastructure protection, resilience, distributed energy resources penetration, traffic management and optimization environmental, and public health.

The fifth common theme that we see in the smart city plans -- systems, we're not talking about, as Joe mentioned, talking about broadband. We are talking more about infrastructure, interface and interface of those systems with the community -- is there is a significant concern and desire to promote social equity and to ensure services to vulnerable populations.

Given that area of focus and what we have observed as one of the smartest things to accelerate smart cities, it had less to do with technology and more to do with creation of frameworks that support and help promote utilities in the city collaboration that promotes co-investments by cities, utilities and other infrastructure providers and smarter integrated infrastructure solutions, joint capital planning and

business models that follow and result in individual private investments.

We think that utilities need to be a significant part of that collaboration and in many instances can and should be. Those collaborations for three specific reasons are noted throughout our work.

First is the penetration of technology. Utilities have significantly less choice than other infrastructure providers and public agencies on whether or not they get smarter. It's based on the nature of the service they provide, electrons, the trends in the marketplace that are enabling customers all the time to do more with the energy options that they have, and, finally, as kind of evidence in the discussion of California, the evolution of every policy regulation that is forcing the grid to be two way and to adjust.

The reality is electric systems have less luxury not to be smart where things like water systems can stay dumb for a very long time. They

need to stay safe, but the reality of pressures of making them smarter and significantly more challenging.

As a consequence, there's a significantly greater penetration of technology in the energy system today and it's a clear trend of that increase penetration and there's a very direct connection between the electrical system and other critical infrastructure.

As an example, the Chicago Transit Authority, the Metropolitan Water Reclamation District, the Chicago Department of Aviation, the Department of Water, and agencies throughout the ComEd service territory, are oftentimes the largest consumers of energy and the most dependent in terms of critical service and operation.

The second point that we think that drives utilities beneath utilities collaboration is that utilities have broad exclusive service territories and an obligations to serve.

The reality is that municipal governments and special organizations are more

significantly fragmented in both their geography and their resource spaces that can lead to very localized and tailor great solutions, but it also works against equitable solutions across a broader service territory, and what we find consistently is that there is usually a very direct correlation between physical stress, and social, and economical vulnerability integrated infrastructure.

The reality has huge implications for equitable distribution of benefits and the ability of primarily private business models for exclusively local business or government models to meet -- fully meet smart city needs for all the residents of the State of Illinois.

And then, finally, the reality of financial capacity, particularly for smart city elements tied to public interest and service enhancement. It's critical that you have money to upgrade the system and to leave the utility's money off the table or not to seek to optimize the mix of investments to achieve public interest benefits would be a significant mistake.

Finally, I'm going to focus on a little bit on some of the opportunities and barriers to utilities and city collaboration and talk about an example provided earlier day.

We do believe and see utilities as playing inevitably a critical role in smart cities. In many instances, they'll be the market and/or the enabler of markets that will be an example to create conditions in which smart cities can advance. To make it work, we think there's a need for regulatory funded models in which public utilities can co-invest and work with each other, and business models that encourage private investment that values and recognizes public as well as private interests.

You know, a good deal of the energy policies that have advanced around the distributed renewable energy, the current discussion around resilience and the price of resilience are all about trying to put a number on -- a value on my public interest and turn it into something that could turn into a business investment.

A business model and regulatory gaps,

there are really two kinds of models everybody talks about. One is focused on cost savings, particularly when it relates to enhanced city services, and then the next is focused on revenue models where businesses want to take advantage of the data that exist and provide goods and services to the public.

First, particularly as it relates to the kind of leading edge of smart city investments which are service enhancements, everybody needs to recognize that in many instances cities, particularly cities that are hard pressed financially, oftentimes don't have the resources and are not providing enhanced levels of services. Because of that, it is oftentimes difficult to fully recognize and value the gains and efficiencies.

For example, there are significant opportunities in public safety associated with smart street lights and sensors, but it is highly unlikely that those -- that that increased information and increased effectiveness of the police is going to result in a reduction in the police force, which is primarily -- which is the primary cost that drives

most public safety budgets within cities throughout -- in this area and throughout the United States.

Similar to that is the example that was provided earlier on rodent control I think is a good one. The significant physical stress post-recession and economic downturn put huge amounts of pressure on the City of Chicago to provide a sanitation service to picking up the garbage. As the workforce went down, as it trended down, it wasn't like the city stopped paying attention to rats. It's that they had to re-deploy staff to pick up the garbage, and so the use of data allowed them to more effectively deploy existing sanitation workers against a significant cost element in their budget, but it did not result in a significant stream of savings or gravy that could be deployed for other things, so there is a real scarcity of responses, particularly within the public sector, particularly within the State of Illinois right now, that is promoting and resulting in significant under-investment in infrastructure and provides significant threats to core services.

Secondly, about it is the way that we structure government funding, particularly fund structures as well as regulated utility fees are designed to create, not breakdown, silos. We put an awful lot in place to protect taxpayers, to protect ratepayers, but those systems do not promote co-investments without active policy and regulatory action to understand the value of the different benefits of co-investments.

Alternatively, revenue-based models tend to cream skim on these communities out of the mix. So we have some fundamental gaps between both the regulatory and funding schemes and the business models. What we want to see is optimized smart city investments that benefit the entire community, particularly most vulnerable.

Finally, kind of as a significant opportunity, because more so than the number of other infrastructure and smart city areas of focus, because the energy system has been under such significant transformation over the last few years as a consequence of both public policy and

regulatory change as well as private innovation and market forces, we generally find that utilities -- utilities and utility commissions, as well as the stakeholders for public and private engage in the regulatory process and policy-making process have a greater appreciation and understanding of co-benefits that essentially need to defend what those co-benefits are put value on and then create some new investments that can take place.

We see that particularly around the area of resilience. We see that particularly around the focus on distributed energy resources and increasingly in the area of smart cities. Thank you.

MS. SATTER: I am the last person. Thank you very much for still being here.

My name is Susan Satter. I'm public utilities counsel at the Attorney General Lisa Madigan's Office.

I am going to try to focus a lot more tightly on the role of the utilities as opposed to a more general discussion of smart cities, although

the smart cities is kind of the underlying theme.

So my first question when we talk about smart cities or any of these innovations, will tomorrow be different from today? I submit that the fundamental role of the utility will not be different, but the fundamental role of the utility is to provide reliable electrical service.

Electricity is an essential service. It must be affordable for everybody. Electricity is distributed by a monopoly provided there's only one place to go, and in Illinois we have retail choice for supply. That means that the utility is not responsible and, in fact, it doesn't have the authority to invest in retail supply and sell it to their customers. They have -- could be an affiliate, but a separate company. So other things will be different, and I think this is what I would like to talk about.

Will there be more rate options to encourage the efficient use of energy? Will there be more customer choice for on-site supply or, I believe what we usually call distributed generation,

DG, oftentimes called rooftop solar, and will there be expanded technology for improved reliability?

So essentially what I'd like to talk about is what I call the utility's role and what are the obstacles and incentives for a consumer's efficient use of energy, consumer savings, and peak shaving. How does the utilities practice -- how do their rates affect the growth of distributed generation solar and how do utility rates and practices affect microgrids and electric vehicles?

So the first question is can utilities encourage energy efficiency by offering more rate options? And I think the answer has to be yes. The advanced meter infrastructure of the smart meters enable expanded distributions and supply rate options that can promote affordability and customer control. At the same time, of course, a limited sweep of rate options can discourage the adoption of energy efficiency measures.

There are many rate options available so that consumers in a city who recognize the value of energy efficiency in terms of cost, of course,

but in terms of pollution, the other externalities that come with using energy, those people have options that will encourage them to do the right thing, the greens that one of the former panelists talked about.

I think everybody is familiar with the options that are generally available. There's time-of-use rates so that times when the system is under the most pressure people are discouraged from using power because of the rate is a little bit higher.

I think of telephone service in the late '80s and earlier where after 9 o'clock long distance rates were much lower time of use. Peak time rebates, that's a peak-shaping technique. A demand response, what demand response options are out there? AMI meters or AMI allows and enables these types of programs to be available, and, obviously, in Illinois we already have access to wholesale markets to encourage price response through real-time pricing. All of these things are enabled and made easier by the AMI deployment.

What are the obstacles? Why are those things not already in place? How do we coordinate the distribution charges with the supply charges? Is the barrier -- is the wall between distribution and supply so great that a utility is not making the rate change that they could make on their side to encourage efficient use of the grid?

Energy efficiency requires consumers to see a benefit. It requires them to benefit on their bills. We're paying less because we are using our energy more efficiently.

We're very concerned that rates that do not recognize that consumer benefit will discourage efficient use of the grid, at least on the distribution side of the bill, and that's a real concern, because if you don't save money by using less electricity, the consumer's incentive will be gone.

So, ultimately, we think that for the future to result in more energy efficiency, cleaner cities, you need creative utility and supply pricing to promote the efficient use of electricity.

Similarly, utility practices can encourage or discourage distributed generation.

i think that smart cities would encourage distributed generation because it reduces cost for the homeowners, it reduces cost for the grid, it reduces pollution, improves reliability. It addresses storm preparedness and it can empower consumers, all good things that I think any city in the future would want to encourage; however, utility net metering roles are key to distributed generation growth, just like consumers will not reduce energy -- to use energy more efficiently. If they see no savings, consumers are not going to want to put solar panels on their roof or, otherwise, participate in distributed generations if they don't see savings, if the savings are not sufficient. Ultimately, that metering should be easier to understand and at the same time recognize distributed generation's value to the grid.

Now I noted that there were less than 500 net metering customers in Illinois, that was as of 2014, maybe there are more now, but we don't have

-- if that is a goal, if that is the city's goal, if that is the state's goal, we have to be broader in our conception of what policies should be adopted.

Certainly cities, such as Chicago with so many multi-unit housing units, require a community solar option to enable growth so that those grids are motivated who might live in a smaller unit in an apartment building have some options available to them.

So looking specifically at the role of the utility in distributed generation, we know that restructured utilities in Illinois serve more than 95 percent of Illinois electric consumers, so clearly the policies of an Ameren or a Commonwealth Edison are key to the development of distributed generation in Illinois.

So I think the questions that we have to ask ourselves, ask people who are in the utility space, who are responsible for the policies, and the rules, and the rates that utilities adopt, we have to ask in what cases do utilities' interests conflict with distributed generation, how does

reduced kilowatt-hour usage reduce distributed generation or energy efficiency affect the utility's approach to distributed generation and energy efficiency, To what extent do -- should distributed generation and energy efficiency threaten the utility's revenues and how do we address that threat.

First, we have to quantify it and address it, and I think fundamentally we should also ask are utilities willing to reduce costs in response to decreased grid use that can be anticipated as a result of distributed generation and energy efficiency.

Everybody wants more service from their electricity grid, but in this discussion we're talking about more than in the electricity grid. I think most people just want to turn on the lights. They're not looking for additional service. They're reducing their usage, reducing strain on the grid.

I think it's fair for us to ask the utilities to what extent are your costs going to be reduced as a result of this reduced usage and this

change in usage and technology, and also I think the question that we have to ask is who decides the extent of distributed generation, the use of energy efficiency. They should be consumer-driven decisions driven, of course, in part by the economic benefits that they will receive.

CHAIRMAN SHEAHAN: Sue, can I ask you a quick question on the point of the kind of benefits that consumers receive. Cost shift in the rooftop solar or even kind of -- even solar is kind of a big issue Russel mentioned. How does your office sort of think about that in the context of promoting DG?

MS. SATTER: I think it's an appropriate consideration. One question is how do you value the contribution that the solar customer makes to the system? They're reducing the -- theoretically, they're reducing the strain and the usage on a particular circuit because now instead of using their prior level, they've reduced their usage significantly, so there's less wear and tear on that particular area, and it might be very localized.

Are there other supports that the

solar customer adds to the grid? There are proceedings throughout the country. They talk about the value of solar and there's efforts to quantify those values - to identify and quantity those values, and I think that's a legitimate thing to do.

Today in Illinois we have net metering, so net metering means we return solar power to the network, to the grid. You get paid the full cost. You get the distribution charge and you get a supply charge as you're selling back at the full rate. Some people argue that that's too high and that that's creating a subsidy of inefficiency and unfairness.

Today in Illinois we have so few solar customers that I would suggest that's not even a rounding error, and I think it's pretty recognized in the industry that that net metering model was there as really a simplification to encourage the development of solar, but, ultimately, you would want to look at a closer analysis of the value of solar. Does that answer your question?

CHAIRMAN SHEAHAN: Yes. Yes.

MS. SATTER: Okay. The next item I want to talk about was the role of reliability in connection with the utility.

One of the panelists pointed out that a fundamental question for any smart city is do you have reliable electricity services. That's the first thing that a utility I think has to maintain throughout, and I think the investments being made are important in that regard.

Now some customers might have a different need for reliability, a different level of reliability, and I think there are three ways that customers can deal with that today. One of them is by developing a microgrid, investigating in a microgrid. One is purchasing backup power, for example, a generator or other redundancies.

Some people see solar electric vehicles as a battery, a backup battery for them, but not all customers have the same reliability needs, and I come back to the same question, who decides what customers need what level of reliability?

Once we reach the threshold, who gets the special stuff? And I would submit that microgrids are special and microgrids are really being promoted in New York because of the strong response.

In Illinois we see microgrids, for example, at IIT, the Institute of Technology, because they do experiments. They have functions that can't take even a blip in their power. They have special needs, so I would say microgrids in smart cities provide specialized functionality, customers would include research institutions, medical institutions, some public institutions, water infrastructure, but rather than have the utility or a regulatory agency decide this is where a microgrid should be, we think it should be up to the consumer to decide.

In fact in Illinois, in our restructured market, there are private companies, private competitive companies, who offer microgrid capability, so today microgrids in Illinois are primarily funded by private companies sometimes with

state assistance, but the utility's role should be limited to facilitating microgrids. We don't think they should be owning or developing them.

Just looking at some of the bids from microgrids in other places across the country, Connecticut, where they are $18 million for nine projects, 15 million for five; jumping down to New York, they're giving a hundred thousand dollars to 83 different projects, and these projects include cities and consultants and suppliers, a huge range and mix of institutions, and I included the URL, in case you want to look at Illinois more closely.

In Illinois, Commonwealth Edison has made a proposal, as it's been mentioned before, for six microgrids. I just want to point out that those come at a cost, and when you are looking at the utility role, you have to ask about that cost. It's kind of similar to the solar. Who's paying?

If you had six microgrids that somebody selected, should you dump at $15 million each and then the utility gets a guaranteed return on top of that, plus 50 basis points to their return on

equity. I think there's a real serious policy question there.

Who's driving the microgrid? Is it the utilities, because they see it as an area of growth for the utility, or is it the customer who says I'm going to shop around the competitive market, get the best deal I can, address my needs directly, but at the same time why are the utilities connecting me but not to own my generation.

I just want to talk very, very briefly on utilities and electric vehicles. Essentially, electric vehicles require charging stations. You can have a charging station in your garage. You can have it in your apartment building. You can have it in the garage. You can have it in a parking lot. You can have it in a grocery store. You can have it in Walgreen's. This is all developing today privately, independent of the utility.

Again, given our restructured market, we think that it's important that utility consumers -- a very small percentage of them have electric vehicles -- not being asked to pay for this

type of investment, particularly within enhanced rate recovery mechanisms. There are maps with EV charging stations, the app on your phone, so you can find out where your EV charging station is, this is all developing.

Again, the utility's role should be to facilitate this, facilitate the growth of this kind of smart cities' functionality but not to own or develop them. I think that's beyond the role of the utility which remains providing affordable service to everybody.

Ultimately we can conclude that smart cities absolutely require utility cooperation, and under Illinois law utilities must provide reliable energy services at the least possible cost. They have to provide service rates that are affordable and that are fair to investors and consumers, while adapting to regulation that allows for ordering transition periods to accommodate changes in public utility service markets.

We think that that calls for policies that build on what we have today while encouraging

what we want to see in the future, such as efficient use of electricity and distributed generation.

I think that we have to be aware of the utility interests and where you might have some conflicts in reaching goals that we want, that we agree we want to see.

We have to be careful that monopolies do not charge consumers higher costs for the services that consumers or the public get.

We want to be careful that the utilities don't unfairly compete with the competitive market, who might be able to provide microgrids and other things at a lower price.

We don't want to frustrate consumer options by not developing the kind of rates that will encourage energy efficiency, and I think I already said you don't want to select a situation where the utilities using ratepayer money to compete with private actors.

So I am addressing this with a little tighter focus on what the utility will do rather than the more general ideas what a smart city is,

but I think that it's fundamental to where the smart city goes.

So I thank you very much for including me and thank you for your time and attention.

MS. McERLEAN: Unfortunately, we do not have time for Q and A, but I'd like to ask everyone to please thank you all one more time.

(Applause.)

CHAIRMAN SHEAHAN: You have got to work on timing, Elizabeth. I had a lot of questions to follow up with folks.

MS. SATTER: We'll have to wait around.

CHAIRMAN SHEAHAN: I don't want you to have to file a case, Sue.

Thank you to everyone for taking the time to join us and our panels. It's really been terrific.

The issues raised today are only going to become more important and prevalent as technology advances. I can't emphasize enough the importance of continuing to have events like this where we have opportunities to discuss big issues and their impact

on the industry, ratepayers and consumers.

I want to thank again Anastasia and Elizabeth for organizing and for our folks, our friends who came from out of town. So thanks again.

(Applause.)

With that, we are adjourned.

(Whereupon, the above matter was adjourned.)

CERTIFICATE OF REPORTER

STATE OF ILLINOIS)
) SS:
COUNTY OF COOK)

CASE NO.

TITLE: Smart Cities Policy Session Agenda

I, PATRICIA WESLEY, do hereby certify that I am a court reporter employed by SULLIVAN REPORTING COMPANY, of Chicago, Illinois; that I reported in shorthand the evidence taken and the proceedings had on the hearing on the above-entitled case on the 16th day of March A.D., 2016; that the foregoing 237 are a true and correct transcript of my shorthand notes so taken as aforesaid, and contains all of the proceedings directed by the Commission or other person authorized by it to conduct the said hearing to be stenographically reported.

Dated at Chicago, Illinois, this 4th day of April, A.D., 2016.

_____
Reporter.