BEFORE THE

ILLINOIS COMMERCE COMMISSION

POLICY SESSION

BUSINESS INVESTMENTS IN CLOUD COMPUTING ARRANGEMENTS

Thursday, September 24, 2015

Chicago, Illinois

Met, pursuant to notice, at 8:30 A.M., at 160 North La Salle Street, Chicago, Illinois.

PRESENT:

BRIEN J. SHEAHAN, Chairman

ANN MCCABE, Commissioner

SHERINA E. MAYE, Commissioner

MIGUEL DEL VALLE, Commissioner

JOHN R. ROSALES, Commissioner

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ILLINOIS COMMERCE COMMISSION

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C3 ENERGY

MR. DENNIS GARCIA,
MICROSOFT CORPORATION

MR. TODD KRAUSE,
ENERNOC

MR. MATT O'KEEFE,
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CHAIRMAN SHEAHAN: I would like to ask everyone to take a seat and we will get started. Welcome to the Illinois Commerce Commission's Policy Session regarding Business Investments in Cloud Computing Arrangements.

This session is convened pursuant to the Illinois Open Meetings Act, and our guests and panelists should be aware that a court reporter is present. A transcript of this session, along with audio and video, will also be available on the Commission's website soon.

With us are Commissioners McCabe, del Valle, Maye and Rosales. A quorum is present.

I would like to thank today's panelists for the effort that they have put into the presentations and to all of you for taking the time to attend.

I would like to offer special thanks to Tom Seibel, CEO and Chairman of C3 Energy, for joining us today. Tom has been an innovator and leader in information technology for 40 years, and we appreciate your time and your interest in this

topic.

The purpose of today's session is to discuss technology advancements in energy analytics and Cloud Computing Arrangements, including the regulatory treatment of such arrangements as capital expenses versus operating expenses under current accounting guidelines.

Given that this topic has manifested itself in an updated FASB Standard and legislation in the U.S. House of Representatives, the time is ripe for the Commission to host a strategic conversation.

My hope is that this session will help develop a consensus around how to incentivize utilities to adopt technologies that will result in increased value for ratepayers, shareholders, and the environment.

Today the Internet has a tremendous effect on the way business is transacted. Everything is happening faster, cheaper, and is more integrated. The workforce is becoming more mobile and product cycles are becoming shorter. These

changes are driving increased complexity and scale and result in a need for massive Cloud computing resources.

In the simplest terms, Cloud computing means storing and accessing data and programs over the Internet instead of using on-premises systems. Cloud computing arrangements continue to gain acceptance in corporate IT departments and are becoming a key element in businesses' ability to deliver IT services securely, reliably, and at scale. It's not surprising that high numbers of companies are migrating to the cloud for cost savings, increased flexibility and, greater ease-of-use.

The most common Cloud computing models are Software-as-a service, where businesses subscribe to applications accessible over the Internet; Platform-as-a Service, where customers develop, run, and manage applications on-line; and an Infrastructure-as-a Service, where providers like Amazon, Microsoft, and Google provide a backbone that can be "rented out" to other companies.

Software-as-a-Service arrangements are now outselling traditionally-licensed software, and Cloud computing is winning corporate converts every day.

According to Rightscale's fourth annual State-of-the Cloud Survey, 82 percent of enterprises have a Cloud strategy. According to Google, 3,000 businesses a day move to the Cloud and more than 3 million have moved into the Cloud since the Cloud's debut in 2007.

In the startup world, Cloud adoption is reaching a hundred percent when a company is building a product or service that will rely on technology infrastructure. It's becoming a rare instance when companies are spending capital on servers and data centers and it will become rarer in the future.

The same cannot be said, however, for utilities burdened by outdated regulations that cause the rate of Cloud adoption to be relatively low. The rapid growth of hardware investments in the smart grid presents an opportunity for utilities

to take full advantage of Cloud computing and leverage the value of the modern grid.

According to Navigant, the next decade utilities will invest billions to make the devices that power the grid remotely IP addressable, including, for example, the nearly 1.1 billion smart meters that are projected to be installed by 2022.

Nevertheless, current regulations and accounting rules impede the ability of utilities and ratepayers to benefit from new IT models by classifying investments in legacy hardware and supporting on-premise software as a "capital expense" while classifying investments in cloud-based technologies as an "operating expense" for which a rate of return is not offered.

This distinct accounting treatment creates a perverse incentive for companies to pursue more costly, and less effective, and risker on-premise technology investments, ultimately depriving ratepayers of the immense performance and economic benefits offered by more advanced technology innovations that other industry sectors

are now utilizing.

With both the utility industry and technology evolving rapidly, it's time for regulators to adapt more quickly and to embrace opportunities that come with being technology enablers. Instead of utilities being restrained by outdated accounting rules, regulations need to catch up with technological innovations to accelerate the goal of a modern transmission and distribution system that benefits ratepayers, shareholders and the environment.

Utilities should not be dis-incentivized from investing in technology but instead should be leading the way in the use of more reliable and more efficient systems. As regulators, we must understand the issues at stake and create rules that support utilities in ways that deliver greater benefits to ratepayers and stakeholders alike.

The discussion among regulatory agencies on how to evaluate these new technologies must be forward thinking given their potential to

significantly improve system performance, reduce capital and operating costs and produce economic and environmental value for the customers and utilities.

All stakeholders need to evaluate the true economic impact of the industry's capital cost recovery model and determine whether it's appropriate given the accelerating pace of change in technology and the value it can generate.

Each of us here today can contribute to the goal of being technology enablers by helping to think about reasonable solutions that regulators can consider moving forward.

We look forward to hearing from all perspectives about advances in cloud-based arrangements, how they can be utilized by the energy industry, and the cost-benefit considerations that exist with these new technologies.

To begin, our first panel will consist of brief presentations by companies utilizing developing cloud-based -- that use and develop cloud-based arrangements.

The purpose of the presentations is to

provide an overview of the advances in energy, analytics and cloud arrangements in preparation for a discussion on how these technologies can add value and what steps are required for regulators to keep pace with innovation.

To moderate the panel, I would like to introduce Jay Hines-Shah. Jay currently serves as the General Counsel and Ethics Officer for the Illinois Commerce Commission. Please join me in welcoming Jay.

(Applause.)

MR. HINES-SHAH: Thank you, Chairman.

As the Chairman said, my name is Jay Hines-Shah.

(A brief pause.)

Sorry about that. Like the Chairman said, my name is Jay Hines-Shah -- after figuring out how to work the microphone -- I will be the moderator for the first panel. This panel focuses on the different types of Cloud computing software technologies and how they can benefit customers.

The format of the panel will be

comprised of 10-minute presentations by seven different persons who will speak for their company's cloud-based technologies for their specific use of the Cloud. We will hold questions until the end of the presentations.

So to kick things off, first we have Tom Seibel. Tom is Chairman and Chief Executive Officer of C3 Energy, a Smart Grid analytic software company. Please join me in welcoming Tom.

(Applause.)

MR. SEIBEL: Thank you, Mr. Chairman, Commissioners, Ladies and Gentlemen. My name is Tom Seibel and I am here from Silicon Valley, although I grew up right here in Cook County. I'm a graduate of the University of Illinois where I studied computer science.

I have been active in the information technology industry now for decades in building companies, including Oracle, a company called Siebel Systems, and a customer agent as we think about it today. I have spent the last seven years involved in a project called "C3 Energy," which is about

bringing this new generation of technologies to bear on the energy value chain.

So I have seen transitions from mainframe computing to mini-computing, to personal computing, to Internet computing, and in every one of these it has been an entire replacement market -- as we made the transition -- enterprise software relational database -- and as we made the transition, I have seen the industry grow from a very small business worldwide to the order of about a $4 trillion business worldwide today, just about a third the size of the U.S. GNP.

And as we made these transitions from one technology to the other, I can assure you everybody had all the reasons why they would never need a new computer, because they already had an IBM 370, okay, and they would never use a personal computer like possibly Zap, Gate, and SAP application software of Oracle, and we would have to hire them to build it for us. Okay.

And so at every stage we have had people who were not going to make the transition and

at every stage these were entire replacement markets, and we are on the verge of an entire replacement market now, and so I will be talking about the economics of that a little bit.

So what we have been looking at are some really new technologies that are coming out of Silicon Valley. They're coming out of Seattle. All innovation in the 21st Century is happening in basically Cloud-based computing. This is your Google, Facebook, Microsoft, Oracle, SAP, C3 Energy. There is very little investment being put in 20th Century technology.

(Slide presentation.)

I will switch here.

CHAIRMAN SHEAHAN: Tom, why don't you kind of talk through it and we will get this.

MR. SEIBEL: Okay. So, if we look at the value -- okay. So if we look at the value chain -- to belabor the obvious for a moment, okay, when we look at the traditional value chain of the utility industry, we have generation, transmission, distribution, metering, customer-care advantages,

and utilities all around the world tend to deal with each of these.

(Slide presentation delayed.)

Do you want my computer?

I remember when I was with Oracle in 1983 there were 20 people there and I had just graduated from the University of Illinois and worked in Chicago for that first year and then went to Washington D. C. where I managed sales for Penn State on behalf of the government -- on behalf of the federal government.

And giving a presentation to the Board of the Federal Reserve, you can't imagine what the boardroom of the Federal Reserve looks like today, and, I mean, you have like, you know, a window up there with, you know, the eye of God, stuff like that. You couldn't possibly imagine.

(Laughter.)

Back then. We used to give presentations -- remember those carousels with the little slides that broke? Presentations at the

Federal Reserve with slides was the most terrifying thing in the world. We don't need the slides. I will get this thing back on schedule, I assure you.

Okay. So let's think about the value chain while these guys respond to the presentation. Okay. We all know what it looks like worldwide. It's largely recognizable by Edison and Westinghouse, and pretty much all of the utilities in the world tend to run -- whether they're fully integrated or not, okay, they tend to run each of these businesses as silos.

We have a generation business, a transmission business, a distribution business, a metering business, and recently a customer-care business. Okay. As you know, very frequently each of these silos report at the level of the CEO and there's not a lot of communication across these channels.

In response, to meet the needs of each of these -- I wish I could work that slide show now -- divisions, you know, the operations -- the information technology industry has been providing

software that do things like meter data management, customer care and billing.

I think we are almost there. Go back to the first slide. Next.

(Laughter.)

So this is what the value chain looks like.

Next slide, please.

Okay. And the industry has responded in Siemens and General Electric, SAP, Oracle, okay, meter data management systems, customer care and billing systems, outage management systems, generation management systems to meet the needs of each of these silos.

The way that enterprise software works -- and this is all -- this is all the type of technology that we have developed in the last century -- okay, but the way that these systems work is they tend not to share data. There's a lot of reasons for that that we don't need to get into right now, but they don't share data.

Now this value chain is -- they don't

do it on purpose. They don't do it because of circumstances, but it's very difficult to share data across these systems.

Now this value chain -- next slide please -- is going through an update -- upgrade this decade where all of these devices are becoming remotely machine addressable.

Now the data, Mr. Chairman, if you look worldwide, if we look at the investment in this entire value chain, I'm talking about the industrialized world, including China, this looks to be a $2 trillion investment this decade. Okay. This is not simply smart meters where we are talking about building into smart meters. I would say Smart Meters are not the interesting part.

So we are sensoring the entire value chain, the thermostat, the variable C-pen at Wal-Mart, the neider, okay, the Step-Up Transformer, the Step-Down Transformer, the synchrophasor, the pressure sensor on the Coal Tar Power Plant, the vibration sensor on the nuclear power plant, and we are sensoring all of these systems so that we can

remote each sensor in near real-time.

Now when we do this, a couple of things happen. Okay. So this begins to look -- next slide. So below -- you know, the systems below -- next slide, please. Sorry. Previous slide. I couldn't see that. Thanks.

Okay. Now we are there.

The systems kind of below this line have been benefitting from the -- from what we call "Morris Law," okay, where basically the power bases have been increasing energy, increasing power. Now when we senor this entire core, it gets to look like a fully-connected sensor network.

Bob Metcalfe, who some of you will remember, and he was at Xerox PARC, he invented a thing called Ethernet which turned out to be pretty useful with an outfit called 3Com and now Hewlett-Packard, if they still exist, and he sent -- this looks like a fully-connected sensor network, but the power of this network is basically the function of the square of the sensors in the network.

And so now we can look across the entire value chain in real-time and do things that are pretty remarkable. Now I won't argue that these smart meters, these sensors do nothing in and of themselves without a software program.

So we spent the last seven years or thereabouts now, I guess a quarter of a million dollars -- next slide -- building a technology platform -- next slide -- okay -- that allows a utility operator, a grid operator, to take the union of the data from all the operational systems, transmission systems, distribution systems, customer care and billing systems, okay, from within the enterprise and from the extraprise, and that includes weather, social media, Twitter feeds, weather forecasts, predictions for solar radiation, okay, and aggregate those data into a unified federated cloud unit.

Okay. We load these data into the Cloud at the rate of 6-1/2 billion transactions an hour in a couple of use cases and then adjacent to that we have an analytics segment, and aggregating

these different sources of data into a unified federal database is an incredibly difficult technical problem. We do this at scale to give you a couple of use cases. And then with the analytics that's also Cloud-based, we can slice and dice this data every which way till Thursday and apply a science called machine learning.

Okay. Machine learning is a new type of algorithm that fell out of AMI, so we all know what an algorithm is. An algorithm is a series of steps that are generally pretty simple that a computer will flow through repeatedly at high speed. It does the same thing over and over again.

Machine learning is about algorithms that get better and better every time we apply them so we are able to look across the entire value chain of real-time from the thermostat to the peaker plant, to the capacity of units to whatever it may be and basically see what's going on in real-time and optimize the machine, the grid -- electric grids as identified by the Natural Association of Engineers as the most significant scientific

achievement in the 20th Century. Okay.

Now when we look at optimizing this thing, mostly we look at the edgiest. We are looking at different sources of energy on one end and we are looking and trying to get people to conserve energy on the other end.

What we are looking at now in using these new technologies created a machine and we can optimize the entire machine, and when we bring the sciences of big data analytics and machine learning to this machine, we can dramatically increase the safety. We can increase the reliability. We can lower the cost and lower the environmental impact of power generation and transmission, and the benefits are pretty significant.

So we manifest these -- when we bring the meaning out of these data, we manifest it in these applications that do things like revenue protection. This is identifying them, using analytics to identify them as a technical loss -- OPAR -- okay -- bringing OPAR into balance across a grid infrastructure.

What's the benefit of OPAR? Okay. The benefit of OPAR is high percent, less energy gets burned to fuel the infrastructure. What's the benefit to Commonwealth Edison of a non-technical loss? Okay. Commonwealth Edison gave to the consumers $9.60 a year, okay, per meter, per unit. That's 4 million a year. Pretty good. Pretty good thing.

If you look across the entire grid -- infrastructure of a grid where we have literally hundreds of millions of assets, and we can tell the pen operator what device is most likely to fail? What's the benefit of this? It's obvious, for safety, for reliability, and also for the cost. The economic benefit according to McKinsey & Company is $40 per meter fee.

So we invest in planning, customer engagement, energy efficiency, demand response, grid resilience, cyber security, the applications of bringing it to the market.

Next slide.

And we have been installing these all

over the world, at Exelon, at GF, at NG, GF Labs, and Enel. Now we will talk about particularly large use cases in a minute here.

We are talking about Enel. Enel is a hundred billion dollar -- a hundred billion Euro utility based in Rome. There's 61 million meters in 40 countries.

Let me put this into perspective. In the U.S. you have roughly a hundred million meters support that are served by 3250 utilities, okay, and now you have 61 million meters in 40 countries by one utility using less energy, 81 million meters supporting each of these companies are roughly the size of the U.S. market.

So what we are doing -- the next slide -- the applications -- the economic benefits of this stack, okay, to ratepayers is about -- to ratepayers at Commonwealth Edison, the ratepayers at Exelon is -- according to the studies we have from McKinsey & Company, a Boston consulting group -- is on the order of $300 per meter per year.

If you think of 4 million a year, this

is significantly about zero. If you get to the 61 million meters in the case of Enel, it is even more a significant asset. And what are we doing there? Enel's identifying -- telling them analytically who's stealing energy and how are they stealing it. Why is that important? Because everybody else has to pay for it. Predictive maintenance, why is that important? It's obvious. Customer engagement, why is that important? It's obvious.

So we are doing predictive maintenance for advanced information distribution assets. We are doing predictive maintenance for renewable generation assets, seven terawatts of renewable generation assets.

By the way, in Enel, Italy, alone we have 32 million smart meters that we have installed, in Spain 12 million smart meters, and there are 50 million smart meters in Europe that were installed at 44 million. We do predictive maintenance, that's 65 gigawatts of financial generation assets, and the economic benefit from this entire stack is on the order of -- I'm not making this up -- about a

billion Euros per year for these countries and their customers.

So what happens is there are lower energy bills. There's less energy consumed. We are safer. The system is more reliable. It's more resilient. It has lower costs and it has less environmental impact.

Now why the Cloud? Let me tell you about the size of the data image at Enel. For Enel, Italy, we have aggregated 7 trillion rows of data into 700 terabyte data images. This, Ladies and Gentlemen, is bigger than a bread box. Okay. And this is pretty big.

We are processing this, and this image grows at a rate of 300 terabytes a day, and in order for us to process these transactions at a rate of a million-and-a-half transactions a second, this is information technology. This is the equivalent of getting about three angels dancing on the head of a pin.

Now this could not be done behind the firewall. It is technically impossible to do this

behind the firewall. We do this on 600 virtual machines on two continents. So when we fire this up, you know -- you know, the lights don't really dim in Rome.

(Laughter.)

This is a computing infrastructure that's inconceivable behind a firewall. It's the type of technology that optimizes the grid infrastructure and cannot be done behind the firewall.

Now we are going to get to the question of security of information, okay, you know, of how secure is this information in the Cloud, because if we look behind our own firewall, somehow we feel safe. We have this illusion, this fiction, that we can control this data and it's safe.

Ladies and Gentlemen, I mean, I would argue the least secure place you could put this information is behind our own firewall. I mean, CNSA, okay, you know, the Department of State, Office of Personnel Management for details, I'm mean, how are they doing? I mean, if they can't

secure the data, what are utilities chances? Zero.

I think our colleagues, Microsoft and other companies, would argue the most secure place we can put this data is in Cyberspace. So these are the types of systems that we are employing around the world, relatively small scale systems, the companies like Exelon, Mobil Gas & Electric and AMI operations, large scale systems in Europe. And, you know, where is this going with the Cloud?

Next slide.

Okay. In ten years -- in ten years Exelon with not have a machine. They don't know that yet. Okay. ICC will not have machinery. The State of Illinois will not have machinery. Computers will go away. You won't, just like you don't have an idea of it. These things are going away.

Let's look at ComEd to get more bang for the buck. Let's look outside of Illinois. Let's look outside of the United States and let's look at the world.

Okay. We are doing business in China.

We are doing business in Japan. We are doing business in Europe. We are doing business all over America. The U.S. is trailing the world in innovation as it relates to energy systems.

Okay. And let's look at quality of power, and one indication of quality of power is the SADIE score. SADIE is the number of minutes and hours that a consumer is expected to use. Okay.

In 2013, the United States was a representative year. It was 241 minutes. In 2014, it was 203 minutes -- I can't see it. Okay. Okay. Let's compare this to the rest of the world. In Italy, it's 40 minutes. Okay. In Germany it's 15 minutes. In Japan -- next slide -- it's nine minutes. Okay.

Ladies and Gentlemen, the quality of service that we deliver to U. S. consumers is worse in class in the industrialized world. There's only one -- there's only one industrialized country that's worse than the United States, and that is Portugal, so we are looking at 2013 and 14, these data are unimpeachable.

So I think that when you see these news releases that come out -- and I'll get myself in trouble again -- that we have, you know, the most robust, the most modern, your know, energy infrastructure on the planet, well, Ladies and Gentlemen, what we are looking at is worse in class. We need to face that. This is a solvable problem.

So I think that, you know, one of the things that has been impeding this innovation was -- you know, I couldn't say it better than the Chairman said it. He stole my presentation -- and basically we are incentivizing our utilities in the United States. They can invest in technology as long as that technology was invented in the 19th or the 20th Century, okay, and they have no incentive to invest in 21st Century technology, unlike the financial services industry, the healthcare industry, the consumer advocacy industry.

So this is something that will solve itself. It's just a question of how long it takes to solve itself, but there is amazing -- we have amazing opportunities out there, and these are very,

very exciting problems where we can increase safety, increase reliability, lower the cost, lower the environmental impact of this value chain.

Thank you for the opportunity.

MR. HINES-SHAH: Thank you so much, Tom.

Next we will hear from Dennis Garcia. Dennis is an Assistant General Counsel for Microsoft Corporation here in Chicago.

Please will you join me in welcoming Dennis.

(Applause.)

MR. GARCIA: Well, thank you very much to the Commission for inviting me here today.

(A brief pause.)

So I am not going to talk too much about Microsoft. I am going to provide what I like to call Cloud Computing 101 Overview. This is just a basic level set of what the Cloud is all about.

Advance the slide, please.

I am not an engineer. I am not a technical person. I am not a salesperson. I am a lawyer, and I'm going to provide you with an

overview of Cloud computing from a lawyer's perspective.

Please advance the slide.

I think a great place to start when you are talking about the Cloud is to realize that Cloud computing in many respects is not new technology, and many of us have been using the Cloud for a long time. Many of us have been using web-enabled E-mail for years until the late 1990s with the advent of the Internet.

I know I started out with an AOL.com account. I moved to a Yahoo.com account, and when I joined Microsoft, I had a Hotmail.com account, so we have been using E-mail for years, and Cloud computing powers E-mail technology.

We should also realize, whether we like it or not, the Cloud is becoming ubiquitous in our society. Many of us are using Smart phone devices. A lot of data is generated in Smart phones. All of that data, most of it, is stored in the Cloud. Many of us use social media. We use Facebook. We use LinkedIn. We use Twitter. I know

I use Facebook way too much. All of that is powered by Cloud computing, so it's important for people to realize just from a level set perspective.

In terms of the formal definition of Cloud computing, there's no one formal definition out there. There's lots of different definitions. Back in 2011 the National Institute of Standards and Technologies (NIST), part of the Department of Commerce, came up with their view of how to define Cloud computing.

Now I encourage everyone to take a look at that definition. I've added it on Link. It's not a white paper which contains that definition. I'm not going to review that definition. That definition is a little bit complicated and involved for me, so I prefer this definition.

Please move to the next slide.

This is a very straightforward simple Cloud computing definition. Folks may say that it's too simple, but I love it. Cloud is a fancy way of saying stuff is not on your computer.

(Laughter.)

You may view that as being overly-simplistic, but I believe that really captures the essence of what the Cloud is all about. I actually found this definition in a Pennsylvania State Legal Ethics and Cloud Computing Opinion.

The Cloud computing is all about off-premise computing or remote computing, and what I mean by that is back in the day when I started working at Microsoft back in 2003, we were licensing our technology, Windows Office, as an example, to our customers, and those solutions resided on the device or the personal computers of those individuals. They downloaded that solution and it was resident on their device.

Many of our customers on-premise have these huge computer systems, server racks, server farms, mainframes. That's where they store their data, but the movement to the Cloud has really outsourced all of that technology to a third-party Cloud buyer who will manage that for you. You can now get computing devices to power your IT needs

through the Internet.

Please advance the slide.

Really what Cloud computing is all about in essence are data centers. I don't know if anyone has ever been to a data center. Data centers are these massive facilities the size of football fields which contain lots of computers, lots of servers, which contain data and it's powering Cloud provider technology to provide its services remotely to customers.

On the right-hand side is an aerial view of our data center located in the suburbs of Chicago very close to O'Hare Airport. If anyone is interested in taking a tour of our data centers, we would be happy to accommodate you. It's a highly secured environment, but we encourage our customers to actually see the Cloud in action to see what a data center is all about.

At Microsoft we have over a hundred data centers based in 40 different countries and many Cloud providers use secure data centers and that's where data is flowing through. It's really

all about the data center.

Please advance to the next slide.

When you think about the Cloud, I like to call this the big three of the Cloud. Generally speaking, Cloud computing is provided through three types of mechanisms: First, the most popular -- something that a Software-as-a-Service where a cloud provider is providing their technology to you via the Internet. All you need is an Internet connection and you can get access to those services. It's not stored on your device on-premise.

A great example of Software-as-a-Service is Microsoft's Office's 365 Solution where you can get the Office products. It's just by having access to the Internet and locking in your credentials to the site.

A second example of cloud computing is something known as infrastructure as a service, what I call hardware as a service, whereby customers can really rent hardware and computing power through a third-party Cloud provider, and they can rent those needs and acquire those needs as they need it. It's

highly scalable. A great example of Infrastructure-as-a-service is Microsoft's Assure Solution.

Finally, a third mode of Cloud computing is something known as Platform-as-a Service. These are probably more germane to developers, developers of software for web technologies, and providers of Platform-as-a-Service really provide users with a platform sandbox, if you will, computer sandbox where you can create your applications or software needs again using their remote solutions.

There's lots of benefits associated with moving to the Cloud. I'm not going to go through all of those benefits, but one of the key benefits, which we message to our customers and which our customers don't realize it, is that they can save a lot of money moving to the Cloud.

If you move to the Cloud, you don't need to have these massive servers, and mainframes, and computers on-premises. You don't have to buy them. You don't have to lease them. You don't have

to maintain them. You don't have to spend a lot of money powering them up. You don't need to employ folks to maintain them and to fix them.

So we tell our customers you stand to gain a lot financially if you move to the Cloud. This is a very attractive proposition for many of our customers who are interested, of course, in saving money.

We also believe that the Cloud can improve your productivity. You can get any time access on any device to key Cloud solutions. It also allows you to really focus on your core business. It allows you to get out of the IT business, if you will, focus on your core business, really serve your client and customers.

Then also, assuming that you are working with what we like to call at Microsoft a trusted Cloud provider, we believe that you can enhance your security in moving to a company like Microsoft. Quite frankly, we can secure your data a lot better than many of our customers can on their own.

We encourage our customers to really take a look at our data center, understand our compliance and security standards and our contracts in terms of the level of detail which we take to protect our customers' information.

Please advance the slide.

Now some folks will say that there are concerns in moving to the Cloud and we hear them a lot from our very important customers. Some customers will say, well, I have security concerns moving to the Cloud. I don't feel comfortable entrusting my data and my customers' data, my clients' data, other third-party data to another third-party, and we understand that and we appreciate that.

Some folks will say that Cloud providers may be a bigger target for hackers. There's also a perspective that moving to the Cloud contains a bunch of hidden costs associated with doing that. If you are a big enterprise and you need to migrate a lot of data to the Cloud, it may be timely. It may take a long time to do that. It

may be very expensive to migrate that data. So some of our customers also raise various concerns which we work in concert with them to address.

When you look at the Cloud provider market today, I call it a very crowded Cloud provider market. Cloud business has grown exponentially. There's a lot of opportunity there, but when I look at the market, I look at it as four key segments. The first segment is the traditional information technology providers, companies like my company, companies like IBM, companies like Oracle.

A second category are these Cloud providers who like to say that they were born in the Cloud. I'm not sure exactly what "born in the Cloud" means, but some examples of those companies are Google, Amazon and Salesforce.com.

A third key category are these newer marketplace entrants into the Cloud. They are smaller companies. They have not been in the business too long. Some of them make money and some of them don't make money. Examples of those companies are Box and Dropbox.

And then I think a fourth category are these Cloud providers who perhaps were really never information technologies-based. Perhaps they were in a different industry, like the phone business and telemarketing, and they decided to re-engineer their business to provide Cloud solutions. For example, those companies are Verizon and AT&T, so I hope that provides you a perspective of the marketplace.

Go to the next slide, please.

One of my key takeaways from my message today, obviously energy companies, utility companies, deal with vitally sensitive and important data. They provide mission-critical services to all of us, so if they're going to move to the Cloud, it's absolutely imperative that they have the goal of also identifying what we like to call at Microsoft a trusted Cloud provider, something which our president and chief legal officer, Brad Smith, likes to say time and time again. Nowadays companies will only use technology if they feel absolutely confident that they can trust it.

I will take it a step further. I tell

customers for whatever reason if they don't feel that they can actually trust their Cloud provider they shouldn't just walk away from that Cloud provider, they should run away from that Cloud provider.

May I have the next slide.

You may say, Dennis, that's great, but how do I go off and find this so-called trusted Cloud provider? And I know we are coming up against time, so I'll just cover this at a very high level, but we encourage our customers that if they are moving to the Cloud that they should be focused on what we call "four key pillars" in doing due diligence in identifying this so-called "trusted cloud provider."

The first pillar is in the area of transparency. You want a Cloud provider that's truly clear and transparent to you and the entire marketplace with respect to their Cloud business practices.

The second key pillar is in the area of protection, data protection. You want to work

with a Cloud provider who really goes above and beyond protecting your vitally important data. Of course, it's not just your data, the data of your clients, your customers, your vendors, your partners, other key third parties.

The third key pillar is in the area of compliance. You want to work with a Cloud provider who should comply with certain key laws, key standards, and hopefully provides a pathway for companies to achieve their own compliance.

And the fourth key pillar is in the area of control, data control. Although you are entrusting a third-party Cloud provider to protect your data in their data center, you want to make sure that Cloud provider enables you to continue to own and control that data.

Please advance the next slide.

I don't have a lot of time to go through this, but what I put here is -- under each pillar I put together a sort of a checklist of various subcategories in consideration which customers may want to take into account under each

of these pillars.

If you would advance the side.

Other subcategories for protection.

Please advance.

Other subcategories of compliance and control.

Please advance.

I have also added in my personal top ten contract terms which should be in any Cloud contract between the customer and a Cloud provider.

Please advance.

And I have added some third-party resources that you and your team may want to consult to learn more about Cloud Computing, and this is my contact information. That's what I have here, and I appreciate your time.

(Applause.)

MR. HINES-SHAH: And thank you, Dennis.

Next up we have Todd Krause, Vice President of Global Utility Sales at Enernoc Corporation. Please join me in welcoming Todd Krause.

(Applause.)

MR. KRAUSE: Thank you. Can you hear me okay? I'll make sure I'm not too close to the mic. I know not to do that, so I won't.

(Laughter.)

Thanks for the opportunity this morning. It's great to be here in Chicago. It's near and dear to me. I lived here early in my career. It's great to be back here this time of the year versus maybe a couple of months from now when the conditions might get a bit different, so I'll be very efficient this morning and cognizant of our schedule, and I'm really going to talk about three specific things. Number one I'm going to address what I believe is happening in the energy industry.

There's a significant transformation occurring, and I think it's important to be grounded when we talk about this Cloud computing with why now and what changes are happening in the broader energy industry and utility landscape that actually dictate that now is exactly the time this is so critical, and then I want to speak very briefly about what

utilities are saying; why they're getting very serious about how they serve customers; how their efforts in the new formation of customer service offers services within the utility construct, and so we'll talk a little bit about that, and, finally, I'll close with just a few words about Enernoc and how we fit into the landscape.

So you might be looking at this slide and saying, wow, what happens next, and I'll ask the question where were you -- you don't have to answer out loud -- on March 20th of this year?

If you were in Germany, you were in the news with the topic of the fact that there was a full solar eclipse, and in Germany, as Tom referenced, they're ahead of us. They have a peak demand in the German electric market about the unit cable box. Just to give you a frame of reference, it's about 3 1/2 times the size of ComEd and they can serve up to 50 percent of that with solar generation.

Well, if you get a full solar eclipse and you are 50 percent relying on solar, it's hard

to say what's going to happen. That's exactly the scenario that faced the four German TSOs on March 20th. It's really important to talk through this, because it's a great example of where we are as a world when it comes to the energy industry.

Now the great thing that happened is, and a side note one of the TSOs actually shared with me, that they approached March 20th similar to how many companies approached Y2K back when we entered the 2000s. They just didn't know what to expect, so they were able to manage this thing very safely, but a key component of the solution was Cloud-based software solutions that helped on the demand side of their generation and demand-side consumption stack to help balance the grid and insure stability through a very interesting event.

And I think it leads us to say, well, how do we get here and where are we going? If you look at -- Tom referenced the greatest development in the 20th Century was the electric grid, absolutely the case, but if you look at it from the late 1800s to early 2000s, fundamentally it changed.

It focused on the concept of an incentive plan. They have a distribution network in the name of the consumers.

Next slide, please. It's hard to see, but if you look forward ten years from today, it is a very different world, and it is a very rapidly changing world. It is a world that includes solar generation. It includes battery storage, and it's very, very quickly becoming affordable at an end-user or residential or business level. It includes electric vehicles, which are basically grid tools on wheels. There's a massive transformation happening and it is affecting no entity more than it's affecting electric utilities.

Next slide, please.

So when we speak with utilities, which we do every day, a lot of these issues that you see on this slide are things that they're doing, which, as a matter of fact, they're trying to figure out how are we going to redefine who we are in this new world -- in this new world of transformation that's occurring.

Next slide.

And the thing that's at the very basic level of driving transformation is that end users have a choice. This is something utilities have never dealt with, thus, the formation of customer service organizations. They have choices in places where it was never perceived that there would be choice.

We are in Chicago, which is part of a new energy market. Customers here apparently have choice. There's parts of the U.S. where they don't, but when you introduce the new technology, such as PV storage, they do, and so it's a significant transformation that is driving a new way of thinking and it's driving the need for new tools.

Next slide, please.

That doesn't look right, but that's okay.

(Laughter.)

MR. HINES-SHAH: I put that one in.

MR. KRAUSE: I like that.

Next slide. Pretend we didn't see it.

(Laughter.)

So what you see here is there's been studies done year over year of the utilities and energy retailers around the world, and those surveys are very, very interesting. They're telling with respect to what utilities are investing in, what they're thinking about, and, without question, they're trying to figure out how do we better serve these customers in a computer age? How do we engage customers that grew up with mobile devices in their hands? How do we achieve our goals as mandated by regulators in this new world?

The next thing to try to figure out, which is very related, is in a world where my customer cannot only be someone that buys a product from me, energy, for example, they might also produce energy that I want to buy back.

How do I build a relationship with them that allows us to exchange that product in a meaningful way? How do I become their trusted energy advisor.

So those are some of the high level

problems that utilities are trying to face. Those are some of the transformative things that are happening in the world that we are experiencing today, and we have dealt with this before. There's other industries where these problems have been faced and solved. It's interesting.

I heard a great analogy recently at a similar, but different, event. Look at the taxi industry. If you think about the transportation industry, typically what does a taxi think of when they think of a customer? What's the term they use to describe a customer? A fare, right? What does a utility think of or describe a customer historically? What do they call them?

COMMISSIONER MAYE: Ratepayers.

MR. KRAUSE: Exactly, ratepayers. Interject technology, Uber. All of a sudden you have got this highly-efficient mobile tool, two-way engagement, whereby me, as a consumer, I rate the quality of service I get.

Guess what? The service provider rates the quality of the customer that I am and

makes the system much more efficient, utilities again, going back to the concept of a customer service order. They're no longer called customers. They're ratepayers. They're saying we have customers. We need to serve them. We know we need to do it better and we need to do it more efficiently, so those are the times that we are experiencing. I think everyone on this panel probably agrees with me. If they don't, I look forward to that part of the panel. It will be interesting. And where do we fit in this?

So Enernoc historically has been around since about 2001 and we are most known for demand response, and that's where we built the company. That's where we're based, but over the last many years we have taken our software technology that built demand side networks.

In Chicago, for example, we have the equivalent of several power plants just throughout end-use sites that are connected to technologies that if an energy shortfall develop, we can deploy network operation centers and reduce the stress on

the electric grid.

We've taken that technology to expand it to allow us to serve a much broader business base and answer some of these key questions that utilities are asking, and I think it's unique for us and it's fair to comment that we have chosen to focus very deeply on business customers, so your C&I and small, medium businesses in which there are many.

The reason for that is we think through our technology platform and our knowledge of end-use customers, that we serve both utilities and end-users equally, that we can develop significant value to all the parties.

Next slide.

We do this pretty simply all in the Cloud. We have developed a platform that can serve all classes of customers, and this includes not only better serving utility customers throughout their various segments, it also includes delivering significant value back to the utilities in terms of efficiency within their operation.

(Next slide.)

I'm not going to dwell on these in the interest of time, but what we see is very exciting and what we are thrilled about is the data access that's existing and ever increasing day over day.

Tom mentioned AMI. AMI is a wonderful data source. We are seeing though that beyond AMI. With the technology that we are developing, we can go capture summary data for end-use customers. We can take that data, run it through our analytics engine and move a monthly data point and deliver really significant information to customers that, you know, a couple of years ago were kind of ignored.

That small, medium business customer class is a very, very challenging customer class to touch, because when you look at them through the East Coast, you'll see that they all get lumped into a single bucket, but when you drill into how they act as individuals, it's very, very different.

So now we have the technology in the Cloud that allows us to acknowledge the differences

and treat them equally and influence them in ways that are very beneficial to the grid, the end-use customers and to the overall industry, back to kind of how people do business, back to this world of mobile devices.

How we communicate is ultimately what dictates how successful we will be, so we really try to build our Cloud-based software in a way that meets customers where they are.

Customers want to be communicated to on their device in their hand while they're on the train. They want it on the desktop, but there's still a lot of people who don't use those devices, and the number is decreasing probably by the hour, but there are, so we need to meet them where they are.

Next slide.

And, finally, this is just a very high level summary of some of the benefits that we deliver, again ranging from increasing customer satisfaction, customer engagement around how do we achieve energy efficiency mandates, and then

ultimately operational efficiencies both within the organization of the quality of the utility and also within helping deliver more reliable infrastructure as we introduce more renewables that we are constantly seeing.

Next slide.

My final comments. I love this space. I love being a part of it during this transformation, and I think what we do is really exciting and I think we are great at it, but there's a lot of people out there doing great things, and it's a new unique system.

So we believe that we need to be very flexible as a Cloud-based provider to help to allow us to deliver value within that ecosystem. This includes how you interconnect solar, how you interconnect storage, how you interconnect end-use customers in all classes, and how you serve them appropriately.

So a lot more to come on this side, but we hope that in the future we will be down to one platform, obviously, this is the main system.

Thank you very much.

(Applause.)

MR. HINES-SHAH: Thank you, Todd.

Next up we have Matt O'Keefe. Matt is Director of Regulatory Affairs and Market Development for Western North America at OPower, a software company based in Arlington, Virginia.

Matt, lead the way.

MR. O'KEEFE: Good morning. Thanks for having me here today. This kind of conversation is not happening in rooms like this all over the country necessarily, so thank you so much for your leadership on this issue and talking about this.

OPower is known for building bridges in Nevada and building bridges here, and I am proud to say -- with two guys without ties to my left and two guys with beards to my right, I apologize for the lack of -- you can't take us out of Silicon Valley.

(Laughter.)

Today I am going to focus in on some of the micro activities and some of the micro

examples of what software service and the Cloud can provide impacts on customers.

As many of you know OPower and you know our focus and our work on customer engagement and that we are a provider of demand-side management, customer engagement software solutions to the utility industry, but I want to talk about how that actually hits the ground here today.

This is an incredibly small text on this slide here. It makes it kind of hard for you to see, but just to note the scale of a company like ours -- because it was born in the Cloud, which is a great way to begin -- we work in about a hundred utilities throughout the world, and our software is employed to 15 million households via web platform.

So, although we are most known for our core work in utilizing efficiencies for which we are quite proud and which resulted in getting customers to reduce energy consumption at more than eight terawatt hours, at this point which is the equivalency to digging in New Mexico off the grid for a year or a house in Chicagoland for 18 hours.

We are incredibly proud of that, but there is a lot more to go, and as we look up to the future in which we are expecting more and more new customers, we have to think about how customers engage with their information and what customers expect as far as the levels of technologies are concerned.

One of our core is that we have taken a look at this broader shift towards a focus on customers, and we thought increasingly about the expectation of these customers and what they want. Because of that, we have built a variety of solutions that cross the utility spectrum, not primarily focused on the residential consumer.

So if you look at the evolution of our product here, we have taken our expertise and engaging with customers more broadly and now work with our clients and utilities to take a complex issue across a variety of contacts from asking folks to engage in response events to communicating about rate changes and engaging people in whatever energy functions overall, and most recently we focused on

building stronger digital relationships with the customers.

But how is that done? Well, it's on the back of our platform, and I'll just give a little bit about what this means so you have a sense of what we are actually talking about inside of this text here.

So this is a three-tier architecture and, as a reminder of a Cloud provider, this is not a traditional enterprise software. There is no installation, no configuration, and our goal is to make IT's problem OPower's problem, and so it's a turnkey solution and it's available from the get-go.

So a third of the bottom there, the analytics there, all this is on top of a whole bunch of data, and this is where we are going to go ahead and integrate the data from the utility, third-party data, parcel data, how we assess this data, why they provide that data, et cetera, et cetera.

We really start to match all this together. We marry and match this data. We are starting to create it more mature than we did

before. So this transformation of data, the processing of data, and trimming of data is actually what we call in the department typical folks who spend 6 to 8 percent of the time on data analysis, so we take all that on our end and we take care of that.

So we are running calculations in this layer to make sure that we want to do things like personalized bill forecasts and beyond. We are processing about 35 billion events each month.

You go up a layer, you have the same. This segmentation target layer is where we take all the data and we start to divide folks into groups. We learn how things are common with each other, so we segment these based upon energy consumption, perhaps demographics or cytographic attributes, and we are able to also import segments that exist within the utility or, otherwise, are able to import through our system, and here we match with the right content with you.

If you are a certain group, a low-income renter, this is where you get matched up

with the best content for you. If you are an affluent green, you might get a content match here from this section of content, so this segment -- there's that top layer -- targeting happens, and that top layer is communicating energy, so going from the data to match a segment to content and then deliver outside. Input is putting paper, digital, and even phone calls from time to time.

So let's talk about what some of the solutions look like at the Cloud and how the Cloud can properly serve the purposes of that. Our core products are residential energy efficiency and to keep energy efficiency have several outputs, one is home energy on-line.

You look down there, for example, at the graph down at the bottom at the management report that is your energy information compared against those of your neighbors and then a lot of complex algorithms and calculations and adapting just to make sure this is data that is normalized with you, that is relative to you and that is properly comparing you to the right ten homes, a

hundred homes in your neighborhood.

Another thing to know is that in the middle of this you see your home is 2400 square feet and not 2100. That immediately changes you in comparison to that line interaction with that data that is available on the Cloud. These things take off more than 50 percent of residential electric savings in Massachusetts and their energy efficiencies.

Here's the way to see how this data holds together. So we were working with one of our clients and we wanted to send out the right message to the right person, you might try to find the right segment.

So at the top level here the department has already designed the data for OPower. That's if you are in the program or not. We put down another layer and we work it as a utility typically provides information which is do we have an E-mail for you or not, then later down we are going to compare you with some third-party data which is external, which might tell us a little bit,

about your ownership rate of the home. That covers that. Then the next layer, which is inside generating our analytic engine, which is about whether or not, based on our design and investigation capability, whether or not you have an efficient HVAC system, an efficient HVAC system or not at all. So you might not have that data on your third-party report, so we can do that inside of our system here.

So all of the facts you have for us are matched together to make sure that we are sending that HVAC to the person who needs it the most, nothing saying that the person already had an efficient HVAC after that who needs it the most.

Given the time, I will move forward. Another thing that is important to the way we solve this altogether is this machine already running more and more or about the way people actually use energy during the day. We work with our clients the same as our customers not based upon demographics and cytographic information but upon their actual energy consumption.

For instance, we start out with eight profiles of all of our customers, eight architects most people fall within when it comes to energy consumption during the day. It was just the tech side of these on the market, as you can tell, but this year is a way of using the data that's out there without actually using patterns or segments properly, then as more data came on-line, we want to share out all our clients using this information. It really wasn't eight. Truly it is five that we were using more data and more data pilling on to the system and it's changing on a weekly and monthly basis how we want to divide up folks.

So I won't go through all the examples. I'll just highlight one more example, which would be the bill advisor where the customer can go on-line about their information, but on the back end the customer certified representatives also have the same information in front of them at a deeper level.

What's turning out on one end result is so important to the customer is that they expect

an incredible amount of insight from their utility, incredible insight from their banks, and from the airlines, and from other legs of industry that no information -- sensitive information is even asked for, like the gate change over at United. I'm surprised United is not charging for that and what folks expect from utilities.

(Laughter.)

We are seeing customers that receive this information have a better impression of their utilities and further trust them with additional information.

It is important that we ask customers to be more and more engaged in their consumption over time. So just to say 400 years of data results now OPower alone, one company doing this, and the collective expertise of this panel is very impressive, and it's not a new area, and although we might be a little bit behind this industry, we are catching up quickly.

And, you know, I look forward to hearing the rest of the folks on the panel who

traveled here today, and thank you very much for presentation about this issue.

MR. HINES-SHAH: Thank you, Matt.

Next up we have Brian Bowen. Brian manages Regulatory Affairs and Market Development for FirstFuel in the Midwest and the United States and Canada.

Please join me in welcoming Brian.

(Applause.)

MR. BOWEN: Thanks so much. I'm the second with a beard, but I did bring a tie, but thank you, Mr. Chairman, Commissioners and Staff for having us all here today. This is obviously a very important and vital issue and kudos to you all for bringing this panel together and addressing it head on.

(Slide presentation delayed.)

As I was just introduced, I want to let everybody know I am based here in Chicago working on Michigan Avenue just a few blocks away, and the company FirstFuel is actually based in Boston. We work across the nation in Canada and

also in Europe now.

So my presentation, when it arrives -- here we go. Fantastic. My presentation today is going to focus a bit on our work in engaging commercial customers within commercial markets through energy data analytics, and the goal here is -- and, again this panel was meant to talk about customer benefits here, so I'll really focus on that, although, of course, there are four-star benefits on the utility side as well.

So, first, of all, who is FirstFuel. We are a customer intelligence platform for utilities. We have about 25 utility customers in the U.S. and Canada and we process a million meters worth of data.

What we do is we take energy meter data, interval data, AMI, and process that information into customer intelligence. We never have to send an engineer out to the building to understand things like how energy is used. It's not mentioned, and we do that to engage customers, offer them the right service and also meet utilities'

energy efficiency goals at large scale.

And I want to mention the way that this has traditionally been done is fairly time-consuming, as I mentioned, getting on the phone with the customer, really finding out what their needs are, but these are -- this is a platform we built that's born in the Cloud as well and is really enabled by technology that five years ago really was not available.

It's really speeding up the process of serving customers, because one thing we know for sure is that customer expectations are changing, and it's not just the residential consumer who is used to having control of their thermostat through their Smart Phone, it's also business customers.

I want to pull out this quote here from the most recent J. D. Power survey on commercial customer energy use, and one of the biggest potential gaps in customer service that they identify is the business customer's on-line experience.

There's a true need from the business

customer. This is a trend across the industry to have a better digital experience, and it plays out in data. It's a bit hard to read, but essentially what J. D. Power found, when they interviewed the first of 23,000 CNI customers, is that the on-line experience for CNI is essentially staying the same and in some cases getting worse. There's been some improvement in terms of the clarity of information navigation in terms of getting around utility websites, but overall they find that the web experience is declining in its usability and it's certainly not doing as well as the most secured in that survey.

This is a trend that doesn't just affect the small customer who acts a little bit more like a residential customer who pays attention to their bill. It affects large users as well, but I did want to hone in on the small customers, because in this survey you see near unanimous agreement from small and medium business customers that they want more personalization. There isn't a one-size-fits-all approach to reaching this market.

There really is an expectation that there should be personalized offerings for SMB customers, and, as you can see on that lower bar, it's a bit hard to read, but it's pretty well real satisfaction with the latest work. These are trends across the industry. There's been certainly a lot of work done here in Illinois to improve on what you see here in the overall results but it's a trend that you see.

So how does FirstFuel address this? Well, the first thing we do is we're providing better intelligence to utilities so that they can understand their customers from the get-go. We do that with a fairly limited number of inputs. We start with the building address making them aware in the world the commercial facility is located, and we take the year's worth or more, if we can get it, of interval meter data at the gas and electric, and what we add to that is local weather data, a very fine grain weather data, as well as GIS inputs, satellite imagery.

We do what you could think of as a

super-charged Google search about that facility. Is it a laundromat or is it a dry cleaner, and we find out if there's such a thing through natural language processing, and we take that data and we convert it into customer intelligence so we can disaggregate whether we can find out how much energy is being used for lighting, how much for HVAC.

We can also set a base line so that performance can be tracked over time, and this is a solution that's really been highly validated for validations on our disaggregation algorithms. It's probably between 2 and 7 percent of the disaggregation you see in your sub-metering or a traditional walk-through audit. It's really been highly validated, and what you get out of this is benefits on the customer engagement side and in delivering efficiency programs, and that's how we do that.

So on the demand side management delivery side, we start very broad. You can see with this rather small amount here we start by looking across the commercial customer base for

energy saving opportunities.

So the red dots on this map here indicate buildings that have a great amount of energy savings potential, whereas the green dots are doing fairly well, and the goal here is to target the buildings that actually have the potential rather than to do marketing or outreach that can be possibly non-effective.

The second step is to go deep, and we made our name as a company that does remote audits of buildings, so rather than doing a walk-through engineering audit, we can get the same results remotely just by processing the data. We then choose to subset the buildings where they are going to get the most bang for the buck for doing that. Part of the benefit here is that it also informs utility staff.

So these are tools that account managers can use to better serve their customers. They can generate printing the E-mail pieces out of the intelligence that we are generating and they can also give customers access to web portals so they

can share share information.

And the final step here in this process is to monitor and continuously engage the customer if we see that it performs a certain thing where there isn't the expected results and we are able to do this, again, at scale through Cloud-based meter data and analytics.

Getting back to the point about customers wanting a better digital experience, we've also built a platform we call First Engaged, which offers exactly that, and it's a self-serve platform for customers that log into their same billing information they use throughout the utility platform for E-billing, for example, and what we offer are billing specific insights about how to use energy more effectively.

This isn't billing like you save this much by doing X, Y, Z. It's actually tailored to that specific site, and through that we are also offering very clear calls to action, a very solid business case for say participating in a lighting program or an HVAC program. The utility is designed

to serve the customer segment.

In addition, there are opportunities for customers to update their information. If their phone number or E-mail changes, that sort of information can be tied into the utility's CRN, so they have a better sense of how to contact that customer, and, you know, we are really doing this on a very large scale, and I want to emphasize that as well.

With our customer EON in the UK, this is being rolled out to upwards of 40,000 small and medium, commercial customers. So really on a broad scale, we are able to offer a great deal of personalization which, as we know, it's what more customers want and expect.

In terms of the other impacts, we have an energy efficiency delivery, and I want to call attention here to our ability to market to more customers by doing that broad analysis where customers are going to have the most potential. We are able to cut costs by one and three times and that means a lower cost per energy efficiency

delivery.

We have also really revolutionized the auditing world. We are two-thirds less in terms of cost of doing an engineer walk-through audit. That's just the cost side. As any of you know who have done the engineering walk-through audits, it's obviously very disruptive in the general course of business. It's hard to convince customers to do that. We can do it remotely and perhaps present the results over a webinar anywhere in the world.

It's much easier to get the seascape involved in that and interested in efficiency, and then, finally, we are able to identify more savings and present a better business case to the customers which means that we are able to do multiple projects per site.

And when we are doing energy efficiency rather than just focusing on-line or just focusing on HVAC, we can really go deeper for the customer and that builds that trusting relationship between the utility and the customer.

And so, finally, just to sort of talk

about our approach and what we think the future of customer intelligence is, in the past we have done an energy efficiency, and the customer engagement, and the customer service, and it was kind of a first-come, first-serve way.

If you are the first one to pick up the phone, you are going to get the benefit, but by doing this broad and deep engagement and really looking across the customer's portfolio, we are able to offer services to customers that are overlooked, that S & P segment, customers that aren't the top person on that account manager's list, and that means better ratepayer parity and available data and access strategy and efficiency.

Again, as I mentioned, we are able to remotely manage the billing and really assess the company and really rely upon the Cloud to do our back-end processing. We are able to do this at high scale and low cost. Here is just a few more customers who believe that this combination of data size are real expertise in building size, understanding how energy is used within the

building.

And our founder's base is an enterprise zap. It's really something that's been attractive to utilities all across the country and the world.

And I really thank you for your time and thanks again to the Commission and I look forward to the panel.

MR. HINES-SHAH: Thank you, Brien.

Our next presenter is Jake Oster. Jake, is Senior Director in Regulatory Affairs for EnergySavvy. Jake works closely with policymakers for the federal government to create awareness about technological innovations for the ESN industry.

Please help me in welcoming Jake.

(Applause.)

MR. OSTER: Starting the time clock. Mr. Chairman, Commissioners, thank you for holding the panel. I appreciate it. Good morning. As everybody said, this is an important topic that doesn't get a lot of attention. We appreciate your taking attention on this, and we look forward to

working with the Commission to think about some of the changes.

I want to talk about what EnergySavvy does, and we have spoken a lot about -- overall about how computing benefits are being drilled down to a level or depth of one sector of utility energy efficiency programs and how they operate and how we can improve their software and what EnergySavvy does. So I will show you a little bit about EnergySavvy in more detail and a little bit about who we are and what we do.

We are a 6-plus-0 company based in Seattle with offices in Boston and we are a hundred percent focused on Cloud-based software for energy efficiency programs. We have more than 75 employees working together in utilities in more than two dozen states. We are in the business of more than 30 utilities at this point. We serve large and small avenues. We serve large munis and public, and we also serve some public organizations that provide efficiency programs to customers.

It's also important to note that the

folks that founded EnergySavvy are former dot.coms, so we are made up of folks that come from Microsoft, that come from Amazon, that live in Seattle, and we realize that energy efficiency programs for the purpose of building software to drive results for the customers and the utilities, and to insure that data collection are being done properly to meet the needs of our customers, and that's what we set out to do. So that's a little bit about our software program overall.

We think of efficiency programs as sort of a cyclical chain in which there are different steps along the way and different things that need software to make it work. The first thing is engagement. You have to engage customers to bring in new orders. The unique thing about energy efficiency is that it doesn't find you. You have to come to them, bring you to engage efficiency.

So we built an on-line tool that is exciting and fun for customers and that easily works for utilities to bring customers in order to get them to the state program. Once you get the

computer to work, it's great. That's the easy part, right. You have to then carry them through a chain of steps to get them into an energy efficiency project.

We build a second tool we call OPTIX Manage manages workflow automation. It is data tracking. It is building a Cloud-based platform that the utility, the customer, and the contractor are all engaged at the same time, and with the customer it is about finding out how you get a contractor, what is your rebate check.

The important thing is customer care. If you are a contractor, you are worried about where your different projects are, manage your project flow, making sure you cut the costs of running a small contracting business to do residential efficiency projects across a wide variety of service territories.

So now we have got the customer at the door and you've taken the program. At the end of the day, we have to measure the impact of that efficiency, and I could dedicate hours talking about

nothing but the energy efficiency measuring. There are piles and piles of paper grids out there measuring something that doesn't exist.

So we built software to speed up and enhance that energy efficiency in ways to improve the experience for utilities, drive value for ratepayers and better reporting parameters. Like I said, I could talk about it for hours.

So let's step back. If you are like me, and, Tom, you may be the only person in the room that actually has a computer science degree. I'm guessing everyone else here is not, So there's a few of us in here.

So if you are like me, to talk about software you need to see what it does. You need to actually touch and feel it, and understand what it's like for a utility, for a customer to actually understand what software looks like. So I am going to show you some screen shots of what our software actually looks like, so you will understand what I am talking about.

So our first product is OPTIX Engage

is about customer data. It's an on-line auto tool that takes you through steps that ask you about your home and gives you an end theory of what your savings are.

We started out with these simple questions at home and then we take this and convert it into 40 simple questions that are entirely interfaced, so I would challenge you that you would not have to get up from your desk to answer the questions on your own. This will take you no more than five to six minutes to answer. It's incredibly simple and engaging.

Most people tell us it's kind of like a video game. It's very simple. Again, this is what we show you, your energy profile, what your potential savings are, and the important things to think about is this is a gateway to utility energy use programs.

When you hit the start button, it gives you a menu option for the history of the customer that exist in the program, but the other value here is the utilities. They need data and you

need data about customers, so you want analytic engine collecting data about the different things that are going on in the home of the customers you engage with the software, and so we are collecting data. We can tell you where the window AC units exist, whether the customer still have light bulbs. All of that data is being collected on a five-base software platform. And when we do this, we start -- we do it for residential customers and we also do it for small, medium and business customers. We have gone after what we thought as energy efficiency.

We have taken the residential tools that we have and converted that to small, medium businesses and then we also recognize that a lot of customers don't engage on that, and so we built a paper-based version of that as well. It's an incredibly successful program we've got. We move for we have a lot of success with this. I don't want to go through out of the steps, but I want to point to one that the box is not properly going over on my slide.

(Laughter.)

Lined up you see that more than nine out of ten people start on-line engagements. That's an incredible average of single digits. Ours is around 93 percent right now; others 93 based on performance, but that's the amount of people we start with. That's getting people in the door. So that's our first goal. That's OPTIX Engage.

The second tool we call OPTIX Manage, and what OPTIX Manage is that it's about analytics, about data management. It's about program automation. It's about making the job easier, making the program easier, the contract easier, and giving the customer the experience of dealing with the utility in a way that's more akin to Kayak or Priceline.

So this is what it looks like. I won't go through this in depth for time, but the other part of this is about analytic reporting.

You know, Commissioner, you probably ask utilities for data about different things that you are trying. Staff will probably call on the utility after reporting energy efficiency programs.

The important thing that you have to realize is that the utility needs to have your data at their fingertips to be able to pull it up when necessary, and there's other things they manage to do without giving utility data at their fingertips they can control and demand.

So, again, I don't want to through all the steps and boxes, but I want to point to one quick stat that we have as a result of employing management utilities and using natural gas efficiently. We have reduced some of their time by 40 hours a week that was spent doing error corrections.

If you look down, you can also see Sound Energy and EnergySavvy from the State of Washington receiving a thousand hours a year on application processing. This is the type of benefit that Chrome software offer utilities about driving inefficiencies, reducing operational hours, and improving the experience of the utilities, but then also driving efficiencies that help benefit the ratepayer when it comes to the expense of energy

efficiency. That's Product one of two Manage and Engage.

I would like to show you a little bit about Product One of three, what we OPTIX On-line. It's our newest product and it's doing measurements in a continuous fashion of a savings venue and we're doing it for every single product in the energy efficiency program.

If you spend time thinking about the evaluation measurement and verification of energy efficiencies, this is a big deal. It's a big change in the industry, and so what you are looking at here is an image of what the industry calls billing housing when we look at usage on an individual premise before and after the installation of energy efficiency measures, and the way we measure today is we have assigned values for different energy efficiency measures.

We say that light bulb for a few hundred kilowatt-hours, so you want to figure out how much energy you saved. Well, we installed 10 light bulbs there or we saved 2000 kilowatt-hours,

but we don't generally go back to the meter and say what happened in the home or business as a result of installing these light bulbs, and that's what we want to do. We want to look at savings in the meter.

The other problem we have in energy efficiency measures today is energy efficient measures are done, with all due respects, with nothing but components. Again, it's not nothing but generally components, and we do energy efficiency Smart bulbs for premise report after the fact that gets filed with the Commission to show the result of that inefficiency. That's really useful and important, but if you run an energy efficiency program with a utility compliance reports today doesn't tell you how you are doing throughout the entire 12 months you are running this efficiency program, and all of that is lost opportunity to the utility that is then lost to ratepayers.

So what we want to do is we want to look at the meter. We want to look at it continuously and we want to be providing continuous

meter measurements on an ongoing basis, so we are doing continuous measurements of the meter. We're not using estimates, and, importantly, we are not sampling. We are looking at measurements of every single process in the program.

So what does this look like? Again, if you are like me looking upward at software, this screen shot of our demo markup of our color-coded block, this is what it would be like if you were sitting in a utility running an efficiency energy program.

You would not only know the processing budget, but you would also know your meter savings on an ongoing fashion, and you would know how that compares against your program goal. You would know how you are doing, useful information, but it's only marginally useful to find out if you are 84 percent where you want to be.

Now you need to know what do I do with that information; how would I actually drive improvements, so now with the granular data, we can slice and dice all of the information collected as

part of the energy efficiency program and show you what is the increase in savings and what's also decrease in savings.

So you might see that LED lighting is doing a good job. This is really small print. LED light is doing a good job. We don't contract for lights.

On the blue side or on the red side of the chart is subject to increase in savings. You find insulation is not doing a good job. You find contractors really under-performing, and then you can go and slice and dice that even further and find out why that contractor isn't performing.

This offers an opportunity to go out there and enforce corrections and insure that the customers are getting the best for that job for their businesses, to sure the ratepayers are getting the most value in their program and for the utilities driving most efficiency savings programs.

So what are the values that come out of this. I don't want to go through this entire stack of what I call pancake propositions. Let me

just highlight two.

So first let's talk about the customer that we were talking about as a panel. If those in the audience have done energy efficiency projects in utilities, they found that you talk to the utility. They do their cross check and got the rebate check and they were done.

At no point at the end of the day did anyone tell you how much energy you saved, and so energy efficiency is this invisible thing that we can't touch or feel, that we don't all trust in, because we can't touch or feel it.

So what about having a project level data to report out to customers, hey, congratulations. You save 15 percent or more on energy efficiency products. Think about what that would do for customer satisfaction or trust and energy efficiency and you can just engage the customer towards data programs.

Another thing we talked about here is we talked a little bit about the smart grid utilities of the future, so one of the challenges

then in the efficiency is the way we measure sort of the trust in the value of the energy efficiency, not just for customers, but also for utilities.

How do we saving is individual? How do we power up the grid? How do we take a year old measurement report and then apply that to the grid and whether we value it and we count on it if there's solar equipment?

You have got to have energy efficiency measurements that are continuous in real-time and value meter so we can understand how it impacts and allows us to build energy efficiencies as an equitable energy resource on par with the -- on par with DR that can give us value measurements to show us the grid reliability energy efficiency it provides. That's what a real measurement does for us. That's the overall energy savings platform.

Again, I want to thank you for the opportunity to be here. I look forward to being on another panel this afternoon and we will talk a little bit more.

(Applause.)

MR. HINES-SHAH: Thank you, Jake.

The final presenter of this panel is Bryon Koskela. He's Senior Director of IT Infrastructure at PJM Interconnection.

Please join me in welcoming Bryon.

(Applause.)

MR. KOSKELA: Thank you to everyone here. I also want to thank the Commission for allowing me the opportunity to speak on this topic, and I want to talk a little bit about PJM's Cloud use and how we choose from a financial perspective and then cover some other thoughts around cyber security and some other types of software models that are out there that also run into the capital expense issue.

So just to refresh, PJM is a Regional Transmission Organization (RTO) that insures the reliability of bulk electric system serving 61 million people in all of and parts of 13 states, plus Washington D. C. We have 940 members that make up PJM, many of whom are either represented in -- some are represented here today and on various panels. We are just over a quarter of the load

generation in eastern interconnection, so we serve a pretty large footprint. To do this, we focus on three things: reliable operations through competitive wholesale markets and regulatory planning.

PJM provides a large amount of real-time and historical data through our website, as well as through some of our web applications, such as database, real-time data and historic data to support market transparency, as well as giving information about regional planning information through our website.

Because of our focus on bulk electric systems and our wholesale market, PJM does not participate in retail markets and, as such, we don't really deal with the end-use customer and the average household customer. We deal with our membership, so a lot of -- some of our presentation today, you know, don't necessarily apply to PJM's focus.

PJM is a highly technical organization. We have a number of technologies that

allow us to support operations and market functions and we have investigated Cloud-based solutions, and I would like to start again by kind of re-defining what we mean by Cloud.

We typically at PJM use software as a service. Again, software that we use through the Internet is not installed upon any computer system in our data center or at our power box. There's also platform service, which is more for web application development and infrastructure as a service which replaces the traditional data center behind the firewall with the data center.

While we looked at these services, we have mainly just focused on software as a service just because it met our needs. We see a lot of benefits that are out there from a cost perspective for us to, you know, not have computing infrastructure in-house from the software as a service.

It also allows us to potentially offset development needs, because really when you are buying software as a service, you are buying a

free package application, so you don't have to customize it as much. You are getting just the package that is delivered.

Right now from an infrastructure and a platform service, we've been very slow about adoption of those technologies. We have looked at them. We have investigated them. We see potential use cases for those in the future, but because of our function, we also are under very critical infrastructure protection standards. We have to comply with them from a regulatory perspective. All utilities need to do that. For us, that's the primary focus.

The substandard require us to identify the computing assets that we have in support of a bulk electric system and then make sure that they're protected through various standards. Because of this mixing in kind of infrastructure to serve as a platform as we service, our core function would potentially increase compliance risk.

Again, we could work with a vendor trying to understand that, but at this point we feel

that infrastructure as a servicing platform we are not quite ready to bring those into our core functioning, so we have been very cautious in approaching that.

However, what is happening is the cost benefits from the limited uses of software as a service, so we have formed what we like to call a power government scheme, and so a lot of moving into the Cloud is really about managing risk, risk to your organization.

What happens if that data is not available or what happens if that data gets breached? What about data confidentiality? That's critical for PJM to have, and our members entrust us with their data and very confidential sensitive information, so we want to make sure that we move very cautiously and carefully to protect that data.

So when we set up this power government scheme, we looked at members from our IT organization, our enterprise security, our procurement, our legal and our risk management folks. They get together and look at various

technologies that are being proposed and brought into PJM, and we review that for traditional IT services, such as availability and reliability, and then we really focus on cyber security and confidentiality of the data that we could potentially be putting on the Cloud.

The team focuses on that risk and looking at the risk and making sure that that risk is being treated so that we are comfortable in moving data there.

So, like I said, we have looked at this for software as a service. We mainly use it for our internal IT, HR function, so the success factor is an offering from SAP. We use that for our employees and for our training, and there's definitely I believe cost savings from having to have those types of applications in our data center versus having it out in the Cloud and from a cost perspective.

I think one of the other things we focus on is ensuring the proper contracting. As Dennis has mentioned, with the Cloud services

there's a lot of factors that need to go into insuring that you are understanding their service level of agreement factoring in leading into Cloud services, that you have a strong contract, that is if there's problems with the service level agreements, that it is contractually enforceable. So this focus on that risk on the contracting negotiations is something that we look at very closely.

With that, the government scheme needed to look at those technologies. The recommendation that I would need, and we do, is that we need to understand the requirements of what data you are going to move to the Cloud; what systems that you are going to move to the Cloud; understanding the impact to your business if that data is even not available or potentially compromised; understanding the service level agreements that you are negotiating and making sure that the Cloud provider is that trusted partner; and you have an exit plan if for some reason they're not living up to the service level agreement.

And you can also focus on the controls that you put in place to protect your data and then also that you put in place to ensure that if you are doing some type of Infrastructure-as-a-Service or a Platform-as-a-Service, there's appropriate security controls that, you know, protect you in case there is a breach at the Cloud provider that doesn't come back into your network, so that's our kind of focus on security.

The last thing that I was going to talk about is again financial concerns. We do typically treat this as an expense. We review it by our finance group I think based on the requirements out there that is an expense.

There is another software model that I would like to bring up for this, which is Open Source software which has gained a lot of traction in the last few years.

Traditional software models you pay that license. You pay capital costs to license up front and then support costs ongoing. You have updates of that software. You have many traditional

vendors continue to operate as well.

In the new model you are paying for support. So the software is Open Source. It's out there for free. You can download it. You have a lot of options.

One option you may have heard of is Red Hat Linux Software Operating System, as well as Red Hat JBoss Application Platform. Those things are open. You can download them. You can use them and then you purchase the support for those tools. That is also typically treated as an expense and yet can be something to consider maybe in the later panels as well to look at that model.

More and more companies are offering that type of model with their software packages, and PJM has moved probably more in that area than in the Cloud services. We do use a number of those packages today and we are running into that issue of expense versus capital with those.

With that, I would like to thank you for giving me the opportunity to speak today on the topic and I'm willing to answer any questions that

you have.

MR. HINES-SHAH: Thank you, Bryon.

(Applause.)

I think in the interest of keeping on schedule, we are going to have to request that any questions be done either -- I know a few of you are speaking on subsequent panels, but feel free to ask questions during the break of any of the panelists.

And I'm sorry. This is really useful. On behalf of the Commission, I want to thank each of the presenters for educating us on sort of the background history of Cloud computing and specifically applications and challenges particularly in the energy arena. So thanks very much to everyone.

(Applause.)

We will take a few minutes break.

(Whereupon, a break was taken.)

CHAIRMAN SHEAHAN: I would like to ask everyone to take their seats and the next panel to join us up front. Thank you again to our presenters for your

insights on the different types and functions of Cloud-based Arrangements.

To commence our discussion Panel 2, we will begin by focusing on existing impediments that prevent utilities and customers from benefitting from these new IT models, whether those impediments can be overcome by utilizing Cloud-based technologies and the benefits of using Cloud-based technologies versus traditional on-premise software applications and platforms.

To lead our discussion, I would like to introduce our moderators for Panel 2. My Legal and Policy Advisors, Anastasia Palivos and Elizabeth McClerlean.

Please join me in welcoming Anastasia and Elizabeth.

(Applause.)

MS. PALIVOS: Thank you, Chairman.

As the Chairman said, my name is Anastasia, and Elizabeth and I will be your moderators for Panel 2. Panel 2 is designed to answer the following questions: How has a policy

market design and rate regulation not kept pace with and may impede the ability of utilities and customers to benefit from new IT models?

The format of the panel will consist of questions presented by Elizabeth and myself with the opportunity to hear from each of our panelists. If time permit at the end, we will take questions from the audience. Before we begin the discussion, we will briefly introduce our panelists.

MS. McCLERLEAN: Thank you, Anastasia.

First, we will be hearing again from Tom Siebel, the Chair and CEO of C3 Energy. Next we will hear from JR. Tolbert, Jr., is Senior Director on State Policy for Advanced Energy Economy.

Our next panelist is Joe Surber. Joe is Senior Vice President and Chief Information Officer at AGL Resources. Our next panelist is Carol Bartucci, the Director of the Smart Grid Initiative and ComEd's Information Technology. Ms. Bartucci is responsible for delivering projects to the smart grid.

Lastly, we will hear from Janice Dale,

who's the Chief at the Public Utility Bureau at the Office of the Illinois Attorney General.

To jump start our discussion, the first question of the panel is what are homeowners and businesses looking for from their utilities that Cloud computing can deliver? In other words, what can Cloud computing do that other less costly technologies cannot?

And I will leave this question open to the panel.

MR. SIEBEL: Do you want me to start? I will take a shot at it. We're on. Testing. Good. No slide is necessary.

As we move from the grid to the smart grid in this kind of fully-sensitive value chain, we have the opportunity to optimize this infrastructure in many ways. And what's in this for the consumer: resiliency, security, reliability, lower costs, lower environmental impact, higher levels of customer satisfaction, higher levels of customer engagement.

Now, as we sensor this infrastructure,

the amount of data increases by six orders of magnitude. Let's think about this. If we read a meter once a month the way that we used to, that's twelve times a year. If we read it every 15 minutes as we will be doing at ComEd very soon, if we are not already, okay, this is going to be 32,000 times a year, so this is a forward event.

We have measurements of units across KND lines. They're delivering signals at 50 hertz cycles. This will be 50 times a second, so the data increases by seven orders of magnitude.

Now the data in just the rates are staggering the data, so the data sizes are staggering, and basically it is -- I would argue, and I think I'm on firm ground here, okay, that it is technically impossible for us to look at loose data without doing an elastic kind of infrastructure until the benefits are clear, okay, and the mandate is clear. It's just a question of how long it's going to take us to get there in the U. S.

MS. BARTUCCI: I am Carol Bartucci again from the utility ComEd in Chicago. My perspective is, you

know, I come from the utility side and that is I think the customers want choice and they want tools or applications that are, you know, customer-user friendly, and me, being the technology person at the utility, we are very focused on running the utility. Making sure we want to keep the lights on is absolutely important. We want to have secure systems from what we develop, but our core competency is not putting together the systems that you saw in the earlier presentation.

You saw some absolutely fabulous software development that for -- if I was going to build that on my own, it would take a lot of time. We don't develop packages like that any more. That's just not core efficiency, and to give the consumers what they really need to manage their electricity or whatever they might want to do with the power usage, these companies are the way to go. They are the ones that develop products that are fantastic as opposed to me just developing it for a smaller, you know, 4 million meters.

If I were to develop something for

4 million meters, it would cost a lot, but I could go to a vendor who has huge experience developing hundreds of millions of meters maybe. Their product I think is going to be better than mine.

MR. TOLBERT: I would add yesterday I had this experience I think sort of incapsulates the way that consumers want to utilize their utilities, the way consumers want to utilize all things that we encounter within a very clear picture.

I was walking down the street here in Chicago during the time that the Pope was speaking on the lawn of the White House. I put my head phones in. I put them into my phone. I lifted my phone out and watched the Pope speak as I was walking down the street.

That's to say consumers want access to the goods and services. They want access to these things at the snap of their fingers. They don't want to have to wait for the monthly bill to come each month to tell them how they might be able to reduce their energy consumption or how they can better manage their energy consumption.

They want all of those things at the tip of their fingers, and the thing that we have seen, and I would totally agree with you, is that there are a host of technologies out there that make that possible for the consumer, whether that be the software device that we have been talking about today, the software platforms, or whether it be a device like NEXT that's in their house, or the solar panels on their roof that gives them the opportunity to be able to have more control over their energy supply, and all of that is really driven by access to the Cloud and being driven by Cloud computing.

MR. SURBER: I would just offer that I think at the core the consumer wants safe, reliable cost-effective energy, and I think we are always trying to find new ways to engage with our customers and you would hope that people just like you interacted at the degree of interest in listening to the Pope on video, that you had the same interest in measuring your power consumption or your gas consumption, and how can you deliver that more effectively.

One of the things I think is really important to understand is the layers of the Cloud that you employ as a utility. Some of the solutions you saw I agree are fantastic solutions, but a lot of them are Cloud native applications that are born in the Cloud applications.

The things that we are embarking on kind of a new area of customer service at the utility front that there are not millions of applications that the utilities have had at their disposal for years, and I think one of the choices we always have to make is what should be in the Cloud or shouldn't be in the Cloud.

I think the point that Tom made several times it's changing fast and the aspirations of the Cloud is phenomenal. The challenge is that if you look at the target chart of the utilities, you have the core which in many cases the customer care system and the operational services system has taken decades to develop. You then have kind of a secondary ring which includes a lot of the productivity apps, especially that Microsoft puts

out to E-mail basically people are already comfortable with.

Quite frankly, the utilities is not my highest and best use of my e-mail system. On the tertiary system, that third ring, those are the things you really see that are beginning to touch people because there have not been an existing application a lot of what we saw just recently in that category.

So for us I think it is a fine way to take that core and use the Cloud technology much like you've seen today to extend its reach to the customer knowing that it's going to take years and years to develop or renovate that core, so we may not have a mainframe in ten years. There are probably some people right now that have a road map that shows the mainframe may be in existence already for 15 years. And how fast we can change that core will be how we use the Cloud computing going forward.

MS. DALE: Janice Dale. Thank you again, Chairman Sheahan and Commissioners for inviting me.

Thank you, Chairman Sheahan and Commissioners for having consumer representatives on this panel. I really appreciate it.

As far as what homeowners and businesses are looking for from utilities that Cloud computing can deliver, I have to say other than remote control of the appliances and basic usage information, I'm not really aware of anything else.

We don't have people calling our office saying I need this Cloud-based service, but I do think we need to be careful when we talk about customers that we don't describe them as a monolith. They're not a monolith. Some customers want more choice than others.

There's been a lot of talk today about customer engagement and the need to engage customers. I think I even heard one of the previous panelists refer to continual engagement.

Well, part of choice is choosing not to engage as well. There are customers who don't want to be engaged and who actually want to keep engagement at a minimum.

I have a cell phone here, a Smart phone, and I don't even want to read all the people who want me to engage with them on a technical basis many times a day.

(Laughter.)

And to the extent that I do take advantage of the services that my Smart phone can provide, which I'm sure many of them are Cloud-based, I use it to minimize my engagement. I don't think that I'm unusual in that respect.

Obviously, there are going to be customers who do want to spend the time and energy on remote controlling their appliances and finding out, you know, on a regular basis what their usage is, but we do -- when we are talking about customers, who are ultimately going to be paying for these services, we do have to distinguish I think between various levels of engagement and different kinds of customers, because I think that's what choice is all about.

MS. PALIVOS: Any responses?

(No response.)

Then we will move on to the next question. Thank you for all of your responses.

Our next question to the panelists is how has the deployment of UIT approaches in the electric and natural gas sector compared to other utility providers for customers facing companies more generally?

MR. SIEBEL: I'm sorry. Could you repeat the question.

MS. PALIVOS: How has deployment of UIT approaches in electric and natural gas sector --

MR. SIEBEL: In the U.S.?

MS. PALIVOS: Yes -- compared to other utility providers for customers facing companies more generally?

MR. SIEBEL: I'll put myself out there on this one and never get back.

(Laughter.)

You'll never talk to me again. The fact is the utility sectors in the United States are behind in financial services, healthcare, consumer packaged goods.

I mean, how hard is it to buy whatever you want to buy, a new radio, a set of dumbbells, or a suit on Amazon? It takes 30 seconds to do click. How hard is it in the U.S. to change a utility service?

Okay. Ladies and Gentlemen, it takes more than 30 seconds in two clicks, three calls to the call center, three times on the web, it's done.

When we look at the level of service that's going on, the Charles Schwabs of the world, the Amazons of the world, the Verizons of the world, the AT&Ts of the world, they are way, way ahead of utilities.

Now let's talk about rate of change, because I think this is very important. I was going to take an example of a European customer that we have. I'm talking about them earlier; Enel, 61 million meters in 40 countries, data centers in 23 countries, all socialist countries, by the way, okay, where they have labor regimens that may look like what's going on in Illinois look like nothing.

Okay. I mean, all sorts of terms.

They just made a presentation to our board. This was -- who was there? Mayo Shattuck was there, the Chairman of Exelon; Connie Rice was there; Spence Abraham was there. In a two year -- there were 1700 enterprise applications that run 23 data centers with 7000 employees, 1700 enterprise applications.

In a two-year period, Enel will close down 23 data centers; in Czech Republic, in Brazil, in Italy and Spain, they're closing all their data centers. They will reduce their enterprise applications from 1700 to 1100 and they will move 100 percent of their data processing -- 100 percent of their data processing from grid operations, customer service, AMI operations. Their demand response will all go into the Cloud. SAP billing, ARP system will all go into the Cloud. This is happening in two years. This is the most rapid, large-scale corporate IT transformation in my professional experience. This will happen in a two-year period of time and think about the labor issue that they have to deal with in all these countries, and technical issues are daunting. They

wouldn't even handle applications. This is happening in two years. So in some places these transmissions are happening very, very rapidly.

MR. SURBER: There are. There are examples all over where people are transformed. Your point about the industry, there's no doubt that the pace has changed, and I think a little bit of the earlier comments about choice and customers not having to -- instead of us having to have aspirations or one customer trying to serve -- or trying to serve people across a lot of different markets, a lot of different customers across the food chain.

When you see companies making those decisions around technology, one of the things you find is that is not sometimes underneath -- I'm not questioning at all the transportation of making things move rapidly, but I think the earlier education we received of Software-as-a-Service, Infrastructure-as-a-Service and Platform-as-a-Service is very important to distinguish.

Also, the things that I want to talk

about what is called Private Cloud. We didn't hear much conversation about that in the earlier conversation, but a lot of the large utilities have already used a lot of these technologies that are available in the public marketplace, built scale within their own infrastructure.

So the result of that, there are examples where the efficiency is delivered from vendors can't be cost competitive to what is being done in the Private Cloud within their organizations, same thing as companies like yours.

I do think that you can tell a story in many different ways where you can say I have two data centers today and I get rid of all my data centers and I could take my application portfolio and I can rationale it down by some number.

I just want to make sure that we are being very careful and understand what the applications are and what the impact infrastructure outsourcing is.

I mean, today my mainframe that operated a lot of our legacy utilities prior to us

getting the Nicor Gas market is hosting down the street and down the road in Illinois.

There's an argument to be made, but that's effectively Cloud computing. I have an IBM mainframe that sits in Downers Grove, because using that application in New Jersey, in Georgia, in different markets to serve that customer one application, that's an easy lift. Moving hardware from one provider to another is an easy lift.

On the other hand, the customer care system that's been developed over a couple of decades involves multiple regulatory bodies and requirements of customers in each state.

The business process involved in the system is the long pole of ten. It's not the technology, and I would love to have that aspirational Cloud, that Cloud technology that I can easily take and transform business processes in some sort of more ubiquitous technology model at a lower cost. That's a nirvana for you guys, and I wish it was there today. And if it was today, I would take advantage of it.

But, unfortunately, when you have to have that level of customization, when you have to have the cost implementation that would be involved and entail, as well as the fact that isn't there, I think the conversation about trusted Cloud provider at the end of the day, I have a problem with our customers' bills aren't going out the door and the customers aren't getting service or not reliable, I'm still accountable.

Now I can go to that vendor and I have a great contract and I can yell at them and I can call the lawyers, but, at the end of the day, I will be sitting in front of this panel again understanding why our company hasn't made investments necessary to serve those customers.

So I think that is a little bit different than the packaged goods industry in some cases where our commitment to serve and the fact that we have this regulatory oversight and I think that capacity makes that burden a little higher and some people are not interested.

I would say we were very deliberate of

understanding our those options, and please keep in mind that a lot of the conversation that we have heard today have not focused on the core of what we do, the transmission, the generation, the delivery, the customer care aspect of a really large system or bulk of that capital investment has been fully deployed.

MS. BARTUCCI: I think the customer system is probably the most complex system we have in any utility and the strategy for where we are going with this very complex issue in a Cloud solution is internal. It really touches every system within the company and the business privacy measurement is huge, so I want to validate that.

Just going back to I guess the real core of the question, smart meters, the whole smart grid has changed to what certainly in the country is what we're doing as a utility. I think it really brings light into a utility. Where I have been there for 30 years, it's a whole new world for a utility and what we're going to do in the future is going to be huge.

So I think maybe it takes a little longer to get going as a kind of a result of where we have been for a hundred years, but the change that we have seen over the past five years, maybe ten years, depending on what company you are with, has been gigantic, and I don't see us slowing down at all.

It really is about understanding how we keep this momentum going, how we take advantage of these Cloud solutions, how we allow ourselves to do that. The innovation that's going to come in the future is going to be provided I believe very much by the Cloud and we can't hold ourselves back. We have to figure out how we can take advantage of it.

MR. TOLBERT: I think underneath that, I would add we saw a bunch of examples from the first panel on utilities that are making these investments in Europe and overseas, and I think that's a good representative piece to this that if other places are doing it, the question is is whether or not U.S. utilities will do it and will move as fast.

I think the first answer to that

question is or the first part that I would say it's clear that we're not doing it as fast as folks in other areas are. I would say in deference to you the one difference is I would rather change my utility service than my cable service.

(Laughter.)

At the end of the day, I'm still getting bills by Comcast three apartments ago for some reason, but I think the sort of piece that's at play in the other analogy that I would use this is that there are times that are out there when industries have to make a decision of the path forward that they're going to take.

The telecom industry was it going to be an industry that was driven by land-line service or was it going to be an industry that was driven by wireless service.

I think most of the big telecom companies will tell you they made the right choice by actually going towards the large focus on the wireless service. I think sort of the further evolution of that though has been to bring your own

device phenomena that's occurred within the telecom industry and the different places that you can walk in with any cell phone you want and you can get service with that provider, and that's really sort of where it's going.

Consumers are demanding choice and demanding technological innovation and not everybody jumps into it. There's that five sort of level of adopters that are out there, but that first sort of one and two segments of those early adopters really tend to drive a lot of the process that's ongoing.

So I think that the utilities have a lot of reasons that the utilities have concerns and I think many of those are very valid.

I think the fact of the matter remains though that we are slower to adopt here in the United States than we are in some other places, and I don't think that the sort of charge or the desire to make sure that we maintain reliable service is different in any country versus another, and what we saw from the slide that we saw earlier, some countries are doing a better job of that than

others.

MS. DALE: In terms of new IT approaches, again, I have to come back to these customer issues, because now we are talking about yet another customer. There's the utility customer and there's an end-user customer variation within those groups, but certainly in terms of IT approaches that are being utilized simply for operational purposes, I think Illinois is well on the right path to implementing whatever is the most efficient kind of technology out there, the Commonwealth Edison and the Ameren, to spend money on metering technology, and peak changing technology, and facility storage technology.

So in terms of purely operational technology, I think we are well on the way. The law is in place. The money is there. They're able to spend it and hopefully they make the right choices and pick the most efficient technology.

As far as consumer-based technology, I think we are still years away from that, and what will happen, again, I'm not getting calls about that

at the office, but it seems to me that the framework is in place to do that and the money is there, and it will be interesting to see what sort of products people come up with.

MR. SURBER: Let me talk for a little bit. I don't think that any of us go into technology -- we don't go into a technology decision and start worrying about how we are going to pay for it. First intent is to figure out the best way you can deliver the solution. Whenever there's Cloud opportunities available, you can bet that everybody in our seats is trying to understand how we go in that direction.

I believe the inevitability, the 10 year, 20-year forecast, and that's one of my biggest concerns is that as a buyer of technology you used to be offered only the traditional model and then they came and said let's make a hybrid model. Let's run it and we will run it for you and you can't own.

Well, now there's a scenario where we have major applications that are in the core that are now subscription-based licensing, so even though

it's not Cloud, the licensing model is adapting or moving to a Cloud, I would say, prepared state so that you get into this mind set of subscribing to a license that you pay for and expense with the intent that at some point when they build that core and have that Cloud available, you will be able to move to more seamlessly. Now that's something that you can almost see, like training wheels stick out, to kind of move people in the direction of those large core systems.

I do think that there are -- the one area that people are being very mindful of are things that you are not uniquely qualified for and making the argument that a utility is uniquely qualified to deliver E-mail or to deliver any kind of other horizontal market-based solution is something we like to leave our business out of.

I don't think it's benefitting us or the customer not to provide that, but it's very key to our operation, and that is an area where over the years, I think the Commissioner's point, we have invested a lot of capital and infrastructure to

deliver those what I would call productivity or non-core systems, and we would have to make a hard shift to change the direction of that, and there is an implication at least in the current financial ratemaking process that we would have to deliberate about understanding what the implications are in the short-term.

MS. DALE: As far as privacy concerns, how much exactly should a utility be outsourcing and perhaps putting data at risk?

MR. SURBER: That's absolutely a concern. You know, I always joke that these technology guys are first at the party and lawyers are catching up, because all of a sudden everybody's running, leaving stuff out, and the lawyer's like do what with the data, and they kind of have that moment, but one thing I think about the data, I am confident that the industry understands the obstacles.

When I say "industry," the technology industry understands the obstacles, especially to serve government, to serve utilities, companies that have that high degree of security. I do think that

there's solutions out there.

I know that like in certain states like the State of Georgia where the State of Georgia has gone into that Microsoft Cloud model for E-mail and the like, they have a -- Microsoft set up a Cloud within a Cloud and they're in Cloud within that Cloud, I mean, so they layer to the point they can insure some of those concerns.

I think that's an area where I would hate to just be a naysayer or roadblock for that thinking only for the fact that I do think that there's some opportunities for the industry to collaborate and solve some of those problems.

MR. SIEBEL: If I could amplify that, Joe, virtually all of these requirements that we were aware of around the world are being deployed into a virtual private, secure Cloud infrastructure. Sure, they are very much dedicated to organization.

As far as security as an issue, when we see the National Security Agency moving major, major pieces of IT operations into Amazon, into Amazon web services, and, I mean, this has been --

this is great security. They have contracted with AWS. This is where they're moving major chunks of data and the data processing, because even the NSA doesn't have the capability of processing the data, and so if NSA can't do it, I'm not sure what the chances are for utilities.

MS. DALE: Tom, if I could ask a question --

MR. SEIBEL: Yes.

MS. DALE: Could you explain or can anybody else explain what it is about the Cloud that would make it more secure than keeping data behind a utility's firewall? Is that something that -- I don't understand, and I'm not sure if other people here understand it either. We have been talking about it with that assumption in mind that it is more secure, but I would like to hear an explanation as to how and why --

MR. SIEBEL: We almost couldn't define a less secure place to put it than behind your own firewall. In other words, it used to be in the old days when we used to use something called core memory, okay, and you kind of needed a forklift to

move the data in the building, you don't need a forklift any more. We basically need -- anybody can walk off with all the top secret information of the Department of State, okay, whether it's behind their firewall.

If you put it into cyberspace, the technology suggest -- I mean, I'm going to meet with you and go along on this with you, but we have gone through all the security compliance and sit through this. We have PG&E, FUG, and others, all this security and they had tried to penetrate these systems, they can't penetrate, and you can put it there where, I mean, you can't get at it behind the firewall. Anybody can get at it, and we're reading about it every day. So it is perhaps in the future the only place where you can secure the data.

MS. BARTUCCI: So from the utility perspective, I think that there are security risks no matter where you are. I would agree just because it's in the Cloud that it would be more secure. I think it's about really defining what security looks like regardless of where your data sits, and having those

expectations, again, regardless of where your data sits or access to those systems, we have to make sure that we prepare ourselves internally and we have to hold the vendor accountable, whether that's contractual, whether that's allowing us access to pen test their system or tell them what you're going to expect of them, they still have to be able to prove. We have to know that our data is going to be secure. We have to hold everyone accountable internally and externally.

I think what the Cloud does bring to us is they bring dedicated resources to support those systems that they already are the experts on, so, whereas, I have many, many people doing lots of different things, they are going to be able -- I would expect that the Cloud is going to be able to patch their systems whoever that vendor is. They know their system.

I have seen vendors react overnight to problems that have been identified. We hear about things that are happening in the industry, some virus or some incident, and they can turn around

overnight and protect our systems. I think they have that reaction capacity that I might not have.

MR. TOLBERT: I think another way to frame this is we talked quite a bit about core competency and part of being in the software business, being in the Cloud business, that secure -- making sure that that's secure is one of the things that is considered a core competency that they have to be able to do. You have to be able to do that even before you can even pass the smell test, so to speak, and as a utility, it's one of many things that the utility is doing and there is a firewall and the people doing that work it's a core competency, but it's not necessarily the thing that the utility is most focused on, even though the utility has a deep commitment to it.

I think that's the other piece to it. I don't want to undersell a utility's commitment to protecting the data at all, but I think that these companies that's a big piece of the way that they have built their brand and built who they are.

MR. SURBER: I'll just add a couple of points. I

agree absolutely with the comments that the people are the weakest link in the security. Where there's a will, there's a way. It's impossible to protect everything. You keep a locked room. You get the key.

I think another analogy I have heard used today is the Cloud computing when it first came out was called a utility computer, and when you think about how the model's predicated, you have got a whole utility industry set up on the fact that's it's better to build in mass and distribute as opposed to having everybody go and put a power plant or gas service in their home every day, and so I think you go back to highest and best use, and, again, it's aspiration, the idea being that people that are best at running the infrastructure run the infrastructure and the people that are best at running applications run applications.

Unfortunately, what are the aspirations to be realized? Right now we don't have that option. I don't think anybody that's sitting in our seats can say they're in a position right now

where they can transition from the existing environment to the Cloud environment across alternate application platforms. It's just not a reality right now.

I do think there are opportunities abound, especially as new technology is developed. AMI is a great example. AMI wasn't around 20 years ago. It was in its early stages, AMR. Now it's evolved into AMI. It's crazy. Do the math. Data problems didn't exist a couple of years ago. That's a problem. They were looking for a solution, but that problem and that solution both came available at a time where there was no solution. There was something else called the Cloud.

if we would have had that solution or that problem brought to us a decade ago, that's what they would have done. They would have build up a lot more infrastructure, and so the only place that you see people trying to still make that commitment or that investment is in areas where they don't have as much choice as maybe to consider or what people thought was conventional.

MS. BARTUCCI: I just want to add one more point, just because it's in the Cloud doesn't mean that IT or a company would not have an interest if there were issues.

So I just picture my face squirm if something happens to the vendor I use. We have a very significant security department that's not part of IT. It's part of the whole company. It does all security and if something does happen there, they're on it, so regardless of who's hosting it, they're going to take that same responsibility.

MS. McCLERLEAN: Thank you.

Our next question will be what have the been the major impediments to faster progress in the area? What are the regulatory, legislative or other policies?

MR. SURBER: I think we already jumped ahead a couple of questions. I think on a couple of fronts, I do think first and foremost that the impediment is that the solutions are not all available. I mean, right now there are certain core systems and technologies that we have employed to meet the needs

of our customers in line with expectations of our stakeholders and our regulators, et cetera, that we do not have an alternative for.

The alternatives are still in that model that Tom described as 20th Century, and unfortunately, the level of investments we make those systems that we don't overburden the customer with cost, in addition to the fact that people are making decisions right now on a 10-year road map with having to make decisions with tools they have available today, and so I can't just necessarily press pause and wait for the market to come to us and not serve the customer during that gap.

So I think they are trying to look at a lot of the architecture that people are considering is how do they build these systems in a fashion using things like service-oriented architecture and the like that would allow them easier transition to that aspirational Cloud once it's fully available.

I would probably say that's how we are sitting today and I do think that there's no doubt

that utilities have largely been building technologies much like the utilities that would build a pipeline or anything else in that you have to build and operate a model. You build that capital -- those capital dollars and operate in the expense world, and you want to make sure that, at least I tried to, make sure that IT is widely involved and that if you go into a ratemaking proceeding or if we talk about how we are going to budget or notify your claim for the utility, you don't want wildly shifting IT costs to be a reason we have to come back and rethink that plan or rethink how we are going to set rates for our customers.

So I do think that in the demonstration that you talked about is understanding how we can kind of change the scene so that if it does become available you can move to it without having to say I have -- where I'm more able to move without causing any kind of undue consequences would be a welcome addition as we look at understanding what the technology market will provide.

MR. SIEBEL: So I am going to set myself up here for Janice to beat me up.

(Laughter.)

I don't think there's any question that the largest impediment to innovation as it was to take advantage of this new generation information technology into the utility industry is the regulatory structure of the industry in the United States, and it is true, okay, that it is a fact that if a utility purchased technology -- information technology that was invented in the 20th Century, okay, they get a return on that investment. Okay. If they have purchased technology that was invented in the 21st Century, they do not get a return on that investment. Okay. It's simple. Okay.

So, basically, all of these Cloud-based software service solutions which are charged having -- when a licensing model happen to be a true model subscription, licensing model having not been in the consideration stage -- had not been in the consideration stage changing with the energy bill that's coming through Washington, this is

changing because regulators are paying attention to it, as you are, and you are out in front, and this is changing really new accounting regulations, so it is with FASB, but I think unquestionably that has to be based on that.

As it relates to the ability -- our ability to do this, let me take a case in point in the U. S. Exelon Company, okay, that's involved in our gas and electric, one of the three Exelon operating utilities, okay, we loaded all of their customer data, all of their billing data, all of their media data, all of their head-end data, all of their maintenance history, 60 billion rows of data into the Cloud infrastructure. It has been operational for a year. It runs all AMI operations and revenue protection from Baltimore Gas & Electric.

The economic benefit to the consumers at Baltimore & Electric is $20 million per year. In the first six months, we identified 450,000 meters that would have resulted in billing errors. So we did it. It's live. It's operational. And let me

tell you these guys at Exelon are no slouches when it comes to security issues. They are all over it.

Okay. They had to pass every penetration test, SIPC compliance. Okay. It had to make sure the data is secure. The system has been provided with 100 percent reliability -- availability for the past 12 months, and there have been no security breach issues, and the way we got that done is we licensed it under a 20th Century licensing model. That was the way to go.

MS. BARTUCCI: So, as I'm thinking about this question, I think we did talk about security quite a bit, but for us, the utility, again, I feel like we're moving so fast, yet, I realize that we aren't moving all that fast but, for us, I feel like we're moving very quickly.

So the two things that I thought about were security, so we -- I mean, we bring power to your house, right? When people want that power on, we cannot take any chances with our systems. We cannot. When we lose power, the power needs to come back on as quickly as it can.

So the system -- if we were going to go to the Cloud on some of our core systems, we'd really need to make sure that there's no risk to security, like that system has to be available all the time, and this is where we do have the core competency. We run these systems really well. I would say the security reliability issues is one thing that would prevent me from moving very quickly. We need to be cautious, because it works really well right now.

I will talk a little bit about the capital account, so right now we do have it in our five-year budget -- home budget building period, and our first thought is not how am I going to pay for this. It's not what is the solution.

What is it we're trying to do? What is the business design the IT person trying to form a business. It's really about understanding what are our needs and that's really the first question, and then when it comes down to what I'm planning, I only get so many expense dollars, right. Expense dollars are scarce. We protect them. We conserve

them.

So when I'm looking at my five years out, I'm looking at my five-year plan. I'm looking at these small dollars, and I really have to understand is the Cloud even in my future. I cannot use capital dollars to purchase the Cloud. I really have to start planning for the next five-year window. How long am I going to depend on this system.

So I know a lot of my colleagues, who's on the next panel, who have the regulatory background, but we really have to figure out how are we going to be able to do this. It's all about innovation. It's about figuring out the systems of the future, and we do have to figure out how we are going to pay for it.

MR. TOLBERT: I would add one thing that sort of I think is a mix of both what you two were saying, one of which is that if we address the regulatory hurdles that are there and the accounting hurdles that Tom mentioned are addressed, if we address those, we will create an enormous market opportunity

for these Cloud-based providers. Regardless of whether or not we can go 100 percent to the Cloud right now or not, there is an enormous opportunity that is untapped because of the regulatory structure that exist in the country right now.

So, you know, I think that's the big piece that I would just want to flag is that if we just look at what are the opportunities for the utility to be able to actually earn off of that investment, what are the opportunities for them to be able to make money and for these Cloud services to make money and knock down some of those regulatory barriers, we are going to create an enormous opportunity for the Cloud service providers that are here today as well as an enormous opportunity for utilities even if we can't go a hundred percent to the Cloud tomorrow.

MS. DALE: I hate to disagree. As far as the impediments to past departments, I would have to say I don't see the impediments that you see. I don't know of any law or Commission regulation that is technology biased. Everything is technology

neutral.

I'm not aware that technology invented in one century is somehow favored over technology invented in another century, which is what I heard you say. I think that, you know, we have the laws, 2.6 million for ComEd. They have guaranteed cost recovery. They have guaranteed recovery of their investments. They have a guaranteed recovery rate of return on that investment.

So as far as cost or financial impediment, I don't think they exist in the way that you describe, unless what you are suggesting is that, and I don't know if this is what you are suggesting, that utilities be permitted to earn a return on their expenses.

I don't think that's what you are saying, but in terms of whether or not a utility can make responsible decisions as a monopoly provider, a provider of essential services, as to what to invest in and what to expense, I don't think, at least in Illinois, those impediments exist. From the regulatory perspective as well, we have been working

on the Smart grid infrastructure since 2007.

There are four dockets. I think the Commission is now on its fourth docket in terms of dealing with data access issues. Those are moving along. Our office and other advocates have participated in those. I certainly don't see the Commission standing in the way of moving toward a place where customers can have access to different kinds of products that they so choose, so I don't see those impediments.

I think the only thing left to be addressed is to the extent that utilities choose to invest in technology, whether they're Cloud-based or not, that would facilitate the innovation that has been referred to here.

Who should pay for that? In terms of customers who want those products and customers who don't want those products, I think that hasn't been settled to the extent that utilities need to make the big investments, but not all customers are going to benefit from that investment. They choose not to buy certain products. I think that that still has

to be decided.

But, as far as I can see from my perspective, we are moving. I don't see any specific impediments. I don't run across any specific impediments from the regulatory perspective or the financial perspective that I have heard from utilities.

MR. SIEBEL: Janice, with all due respect, and you are an expert regulatory matters, I assure you I am not. With all due respect, let me deal with an example that's not related to utility operations.

Let's talk about customer service applications. If a utility purchases a customer service application from a company like Oracle or SAP and they install behind their own firewall and they have a perpetual license and that is through your regulatory spectrum, that's MX, okay, and that is -- it will get you a return on that investment.

If they're purchasing an equivalent system that was developed in the 21st Century of say Salesforce.com, there's a Cloud-based software service, that is by definition Com X, okay, and they

do not get a return on that investment, for that reason they tend to be much more predisposed towards investing in things that they get a return on investment.

Regardless of the reading into the law, I can assure you with a hundred percent confidence this is the way utilities in United States are in trouble.

MS. DALE: Well, you know, I think it's the role of the vendors to convince whoever needs to be convinced whether it's the utility that a particular investment is a prudent way to go, and I think this forum is a good example of how you make that argument, but I don't think we can lose sight of the fact that utilities are monopolies.

They do have a core mission of providing essential service, and to the extent that utilities need to consider how many expense dollars they have and how many capital expenditure dollars they have, they have to take that into consideration, because they are maintaining the system for everybody and not just for select groups

of people, and to the extent you can convince utilities that this is a more efficient way of working, I dare say that they'll listen and certainly the regulators.

MR. TOLBERT: I just want to add, I don't have all of the background on this, but I can tell you there are folks from Enernoc, OPower, FirstFuel, all of the folks that were on that first panel that addressed some of these issues, there's a couple of things that tell me that there is an issue.

One is that even with adjustments to the standard accounting practices -- I don't know if that is a hundred percent the right way to describe that, but the new document on accounting practices that came out this year, there are some high hurdles that are there for investments for the utilities; second, the federal energy bill that Tom referenced earlier is attempts to try to take down some of these hurdles to make it easier for utilities to make these types of investments.

And while I wish that -- I wish this moment in time -- you'll never hear me say this, and

my friends in the crowd know me. You know, you will never hear me say this. This is the one time I wished that I worked on federal policy so that I could help answer this question, but this is something that there is a movement afoot at trying to figure out. There's some things in the meantime recognizing that the federal energy bill was not going move that states can do to address these issues.

And, once again, I applaud the Commission for having this conversation to start to get at that.

MR. SURBER: We talked about this internally. When it comes to the impediments, you look at it through a couple of different lenses, but maybe you can make the argument. I look at that as more of a practical sense of, you know, take an example where you found some of PDD, so PDD they use a lot of Cloud technology. They're doing that stuff without a second ring of the system so that the core of that PDD operation is that CC&B is an application of Oracle, which is the 20th Century model, and they

have invested it out -- I am not an expert, but they invested tens of millions of dollars over the decades building that system and the processes to support that.

So an example Tom is saying, hey, you cut the core. I can compliment the core with a Cloud-based solution. He can do that very quickly and it goes in, but it's not an asset of a utility. It's a service I'm providing. And so when I provide that, all of a sudden that's going to that expense line, and, again, I think -- and I'm not a rate expert or a regulatory expert -- and speaking to them right now, but I think that's where the example would be.

For right now we have gone and built these models to deliver efficient customer care, employee-driven services as efficiently as possible within the regulatory confines, and the fear is that all of a sudden you take something that yesterday was an asset and now it's an expense, then what do I do then?

I'm not the rate-making person. I'm

the CFO and I'm going in and I'm trying to deliver the best services I can for the customers and employees, but I don't want to make a misstep that all of a sudden causes somebody else to come down and start talking about the impact decision on how we are going to effect rates to the customers, et cetera, et cetera.

That's just one part that's a little bit of a slippery slope that I think we as technologists are trying to navigate every day. I think we're right. We want to make the right decision and I know vendors come to our office every day and they understand the confines of the regulatory environment. And the reason that Oracle hasn't gone and invested in moving CC&B to Cloud-based solutions is because nobody would buy it.

MR. SIEBEL: Maybe, again, if you do a Google or Larry Ellison, they're investing in other solutions basically saying these Cloud-based solutions where the customer has the right to take possession of it are to be dealt with as CapEx, that they are the

property of the customer and they are CapEx, and that just hasn't made it through the industry yet. As it relates to the energy bill we work with, that's a done deal. That is a common law.

MR. SURBER: It is. It's interpreted as to an actual ongoing expense.

MR. SIEBEL: It's CapEx. It's certainly a new expense over time like any other capital expenditure. As it relates to the energy bill, we worked with the House Energy Committee and Senate Energy Committee on this basically to the extent to which t encourages the state regulators to give strong consideration to these new generation of Cloud-based software service technologies to the extent to which you just happen to be out in front of it.

MR. TOLBERT: I think that one of the things that folks hear I think that there's probably -- and I could be misspeaking, and it wouldn't be the first time -- but I think one of the assertions that a lot of folks would make is that utilities should be able to make money by improving service, improving

customer experience, and also delivering the product and everything else, and performance should also be a driver in the utilities -- in the way that utilities make their profits.

MS. DALE: And that is, in fact, to be the case in Illinois.

MS. PALIVOS: Okay. We will now take questions from the audience, and Commissioner Maye will go first.

COMMISSIONER MAYE: I think this is a fabulous panel and I compliment my colleague, Chairman Sheahan, for having the brainwork to get us all together.

I agree. I know, Janice Dale, you mentioned that not everybody wants to be engaged. The key is customer engagement and that kind of came across a lot in the first panel, first engaged and OPTIC engage, and all that. I think that that is true. It's the key. Everybody wants to -- at the end of the day, all consumers want to save money. That's the old Russian theme that in order to save more money, saving more resources. That is the key

step, and the first step is engagement.

So I guess this is two questions. Some of it was addressed a little bit earlier, and I understand we are going to address it in the next panel as well, but the first part of my question will be what is it that can be done or what are you trying to do more of? What kind of outreach are you doing to make sure that that percentage of customers that are not currently engaged or maybe they don't want to be engaged?

I don't know if they don't want to be engaged. I think it's one of those things that you don't know what you don't know about. If you know how to save money, you would be getting engaged.

So what is it that you are planning to do or what can be done, and even from a regulated perspective, what can be done to get to that group, that not engagement group. I shouldn't say the disengaged group. It's not that they don't want to necessarily be engaged. They're not engaged, but for whatever reason they don't care what their neighbors' rates are and things like that. They're

not that concerned.

So what is it you are going to do? Second, I think just as important as consumer engagement is regulatory engagement.

Let's kind of push the Illinois Commerce Commission aside for a second. Let's just talk nationally, regulators nationally. It's truly important, and you touched on this a little bit, to make sure that that regulatory framework is understood, and it's understood that in order to have, you know, these next level of technologies -- technological improvements and advancements, which would at the end of the day perhaps lower rates for a lot of our consumers, you have to have a supportive regulatory environment. So what I guess from a regulator point of view could we be doing more of? Thank you.

MR. TOLBERT: I would like to jump in with a consumer engagement. I believe that it's OPower that the story or this example works for, and if it's Enernoc, I apologize. I know it's one of the two of you, but when you see a high demand day

coming and the utilities see a high demand day, these guys have the ability to be able to send E-mails or to send a note to -- an electronic note to a consumer saying that we expect super high demand tomorrow and here are three ways that you can actually save money and reduce demand at your home, which home makes me think it happens to be OPower, but that's a way that there's actual engagement, right.

So because of their partnership that they have with the utility, they're able to communicate that out to a homeowner and the homeowner then is able to make the decision of whether or not they actually want to -- whether or not they actually want to engage.

OPower can give you the stats, but the stats are actually really, really good on the number of people who do lock into those programs, and we have seen that this happens time and time again. So they may not care what their neighbor is doing on that day, but there's been a direct communication to them letting them know that they have the ability to

be able to save money and help overall if they take action tomorrow.

One of the things that I sort of in the very first question that I started to say was that homeowners, folks, apartment research, whoever it is, I want all of my bills, and not everybody wants this, but I want all of my bills to come on my cell phone. I want to be able to pay them on my cell phone. And if you, as the utility, shoot me a note via my cell phone that says, oh, if you do X, Y and Z you could save yourself some money, then that's a way that you are going to get me to take action, right, calls like that and not to call anybody out. You can just look out in the crowd and see the number of people who have looked down at their cell phone. People live on those devices, and we take action based upon what comes in on those devices. Many, many of us do, not everybody, but many of us do.

So I think there are those tools, those resources that allow engagement and that communication and having those tools helps to drive

the larger adoption from consumers.

MS. BARTUCCI: I'm just going to panel in, and since I'm not in a customer service organization, but that is one of our primary goals. How do we reach outside to our customers? How do we get the programming or the -- how do we incent them to take part in a lot of these programs that are off the footer, whether you are managing your power, understanding where power usage comes from? If it's billing, how do we allow their bills to come to them the way they want it to be done? How do we let them Tweet or get on Facebook, or to know what's going on with their power?

We also don't want -- I know there's certain things you don't want to know about though. I think there's a certain percent of the population we're not going to reach, because they have no desire, and I think you have to acknowledge that, but the rest of them it is power getting information on the bill, getting little footnotes. How can you get more information? How can you get more data and really just making it easy for them to do it?

I know for me personally, I go to -- a facility sent me a website to go and sign up for something. I tried it once. If It doesn't work, I'm done, because I know it should be that easy, right, Amazon. You know, there's nothing you can't do with Amazon, but it's so easy. You have to make it easy for people. You have to make it so simple that they use it, just like they use Amazon.

MR. SURBER: So the secret to success of Amazon is it's not a fragmented market. Go to Amazon and you can buy anything. You can buy a book. You can buy a TV with your name on it, and I think one of the challenges we try to reach out to our customers is if you have a water company, a gas company and an electric company, you want to reach the customer. So when you are trying to decide to engage a water company, an electric company, or a gas company, I think that's where one of the things can be provided systems that are going to be accessible to whoever captures that end-use customer, so I think one of these things it may end up being us. We may be the best at it.

The argument may be that Google or somebody like that may be better at it than utilities. How do we provide system and technology to the data? We talked about data that makes that customer touchtone value so they can then find a way in a mobile environment or whether it's a web environment or old fashioned rate environment that they can engage with their energy choices as they choose.

I think from a regulatory perspective, it's understanding what the idea was for the customer and how do the utilities not make sure they're not holding that up so they might not be an impediment to allow customers to engage.

Right now, without there being a single point of contact for customers to make those kinds of home-based energy decisions, there's a lot of people like you saw earlier competing for that lion's share, competing with us to choose to get in front of the customer, and then I think as well we're all competing just within our own -- within the utilities. We're trying to make sure you are

providing the best on-line customer care presence easy if it involves one call solutions.

It's easy to sign up for service. So providing a system a lower competitiveness that no matter who's the best in doing that, we can plug in and provide the data necessary. I think that's really important.

Another thing that I want to go back just a little bit and talk about, another benefit of the Cloud we heard about today, we've heard a lot of software service and companies talk about one of the key infrastructure service is the idea of rapid provision and timing the market.

An example right now, if I wanted to build an application, Let's say that the Regulatory Commission say you have got a great idea; we'd really like to invest in this. So we've got clearance and we got -- we say let's start. You are going to do the requirements, which takes a little bit of time, but then one of these days you are going to procure the system.

You have to set up those systems. You

have to install those systems. You have to provide for disaster recovery for those systems. That lead time is not anything that necessarily happens overnight for those who provide the Cloud capabilities to offer that.

Imagine the day where you say go, we have got the environment stood up to start the project in less than a week, some cases less than a few hours. That's again that aspirational view of the Cloud that people want, but that's the example where in an existing regulatory confine if you don't have that outlet available to you, you have to go buy or procure, set up and install, but if I get a request on a Monday that we want to go innovate for customers or do something beneficial, I can test the availability to hit the ground and no longer be an impediment or obstacle as part of that process.

MS. DALE: I would just add one brief thought. Sometimes customers' priorities are not just to save money but to save time, and I think that the notion of continual engagement impedes customers being able to save that time.

If I use my phone to do banking, it's because I'm trying to save time and minimize my engagement, and I think that that has to be taken into consideration when utilities make their decisions on how to invest because everyone who winds up paying for -- everyone winds up paying for services that only a small number of people use.

We know from the ComEd, AMI pilot that the level of engagement for all those hustles in the pilot were relatively small. It was 7 percent, and sometimes that's really all you need to make a difference in rates and prices for everybody just to be that 7 percent engaged. We do have to be mindful of who will pay for investments that will benefit possibly just a very few number of people.

CHAIRMAN SHEAHAN: I wonder if we could explore a little bit more of this question of expensing on-premise systems versus expensing Cloud-based systems.

Janice, you offered an example of banking on your mobile phone which banks do in the Cloud because the cost per transaction is pennies

versus dollars for a live in-person interaction transaction.

The reason businesses are adopting the Cloud is because the economics are so telling. Utilities don't operate under sort of the normal pressures that other businesses operate under, right. Theirs is sort of -- their economics are governed by primarily regulatory signals.

So I'm hoping the panel can kind of help us understand a little bit about the economics of Cloud-based services versus on-premise services. I think what I have heard this morning is that the future of the grid, which is going to be distributed, is going to be complex. It's going to be two ways. It will demand a level of sensoring and analytics that utilities don't currently possess necessarily.

Under the current sort of framework we have, they can make those investments. They can invest, you know, billions of dollars in building out those systems that they would have in racks in their computer rooms, and ratepayers would pay more

for that than they would for a comparable system, which I think most people agree will be necessary at some point in the future that would be Cloud-based. So the rate -- the impact on ratepayers will actually be higher in the long term, I think.

If utilities are required to actually house these services themselves as opposed to using these services in a Cloud form, which in all other industry sectors wherein they're going toward the Cloud, you know, they're doing it for those, you know, really compelling economic reasons.

So can we have the panel sort of address that question.

MS. DALE: I understand exactly what you are talking about, Commissioner Sheahan, and I have thought about this and, obviously, from the first panel we heard about a lot of different services that are out there that utilities could take advantage of that would make the provision of service to their customers more efficient and more cost beneficial.

But to the extent that there are third

parties out there who will have services to sell to utility companies and to the extent they use utility assets, I do think in order to do that, I do think we need to think about having third parties contribute something toward the assets that they're using and right now, as far as I know, there are companies out there who sell services to utility customers or will be selling services to utility customers in the near future that make use of utility data and utility assets, but they don't pay anything for those assets, in fact, they're simply piggybacking on assets that ratepayers pay for.

So to the extent that third-party profit-making utilities are offering services that they make money on, it seems to me that part of the new paradigm, if you want to use it that way, would involve those companies contributing something toward the assets that are being in place.

CHAIRMAN SHEAHAN: I don't disagree with that at all. My point is more towards the Cloud-based services that will be necessary for actually managing the Smart grid and, you know, it's going to

be two ways. It's going to be distributed. There are going to be micro grids. There's so many disruptive technologies, which we talked about this morning.

You know, Tom described this as sort of a cyber physical network as opposed to what you are talking about, and the real heart of the question I think today is how do you think about that cyber physical network, you know, that network that collects data off of thousands or millions of sensors and utility uses that data to run the network more efficiently.

It's not just, you know, collecting data that some companies sells for a profit. This is more for to sort of the operation of the grid that will be 10, 20, 30 years from now.

MR. SIEBEL: Mr. Chairman, if I could comment, I'm going to get away from the customer engagement subject entirely and dealing with the operation of the smart grid which will require a software plan where we have the sensors with repeaters, what have you.

Now the economics are very clear. In the last seven years, okay, we have spent about a quarter-of-a-million dollars building a technology platform that allows the utility to run these systems, and this is what's necessary for them to optimize both BAR, AMI operations, minimize non-technical lawsuits, minimize technological losses, real challenging problems, and the question is all these issues always related to distributing energy resource management.

This is a fascinating and difficult problem, and you need a large and complex internet foundation. We spent about a quarter-of-a-million dollars, and in the next five years we will probably invest another quarter to half-a-million dollars.

If the utility decides to build that themselves, okay, and spend the number that's a quarter of a million dollars or half a million dollars building it themselves for some period of time, they will get a guaranteed return on that investment.

If instead of investing a

quarter-of-a-million or half-a-million themselves, they license it for say a dollar a meter a year, that is -- the problem is that historically that is an OpEx for which they get no return and that is -- that is the way it has worked.

So I'm not certain -- and so I think the question is I think that clearly the Illinois Commerce Commission is taking a leading role in the nation and is starting to wrestle with a very, very important topic to make sure that we are incenting the utility operators to do what's in the best interest of the consumer.

So it's a very important issue. So that's the math. Exelon and Ameren did it themselves. In taking million of dollars, there would be a return on their investment. Is that really the best way for a utility to be utilized?

MR. SURBER: An example we have is even if we looked at this place where we had spam earlier, so you look at spam we get on a daily basis, it's expounded expedientially and we used to build out a system that would actually go over and track that

on-premise, so come into our data center and we would kind of clean out the spam. It didn't always happen, but that's an example of where we kept scaling, and scaling, and scaling, and scaling and effectively we were buying using capital dollars to buy that infrastructure and stack it up in our data center.

So if you look at it on a dollar procurement, it is an exact match up with this. Okay. We have this much money to clean spam and we will do it for a couple of $10,000 a year and that is one of the specific clear compelling difference in the cost. It's like if you pen (phonetic) yourself, there are better solutions to do it internally and say that's sort of the steel trap why it's so vast, and I think right now there's a problem with some people that are making -- the market is coming is what I'm saying.

There's solutions out there every day that are teetering on an edge, build versus buy, build versus Cloud, where people are going through that evaluation, but at some point I can already

fast forward in the future here. You can see five, ten years from now that that balance or that scale will be far away in favor of the coming technologies, and the world is trying to play catch up in that regard.

I think right now the only case where people are making some of the decisions about that Cloud versus build is where it's a very, very compelling business case.

MR. TOLBERT: It's a very interesting dynamic. When we think of utility regulation, we think of least cost all the time. The energy efficiency programs have to pass the cost-effectiveness test.

Are we going to build a wind plant, or are we going to build a nuclear plant, or are we going to build a gas plant? We look at the economics of it, and this is one of those areas, particularly as we make investments in our transmission grid, after we make investments here, we should be looking at it and we should be saying what's the most cost-effective way for us to be doing this and creating systems in which the utility

can make money off of those cost-effective ways to do it versus being stuck in a model that is if you build it you make the money off of it.

But really thinking about this as what's the most cost-effective way, because that's what's going to be best for the consumer, and what's the best way for us to do this, I think that's the question that we have to look at when we're thinking about how we make investments to our transmission grid.

In all honesty, as we look at the numbers nationally nationwide, the amount of money that needs to be invested into the transmission grid over the next 20 years is astronomical, so this is the time to be wrestling with this question and to come up with an answer.

COMMISSIONER ROSALES. Excuse me. Can I respond? I would like to thank the Chairman for his leadership on this.

What I would like to say, Commissioner, as we move forward, is to not constrain ourselves, and the question would be in

what ways can we move forward?

I have some concerns when we have regulatory constraints right away, which I understand is a business -- which is part of the business and we have to make sure that we're moving in the right direction; however, I would like to see us move forward.

With the amount of talent that we have in this room today, hypothetically, we are going to have the Cloud. We are going to use this. In what ways can we use this, and not only that we look at these costs over time, we start with the telephone.

You mentioned about how everybody has them, but when we first started nobody wanted it. It was too expensive to have. I'm not going to pay that much for a minute, and now it's a fact of life. This is going to be a fact of life 10, 15, 20 years from now.

So in what ways can we utilize this now, since we are talking about it, in this type of age and not going back to the 20th Century and moving forward? We know we are always going to have

restraints. There's always going to be a red light, but for today there's a green light.

Let's talk about ways in which we can move forward, because it's going to occur. There are many people who don't want it, but there's a lot of people that want land-lines, too, you know, and a percentage who want the strings, and we move forward in a different direction.

As a Commissioner, that's what I would like to see. It's not a policy decision. It's just kind of using hypotheticals, but that's the way it's going to go.

COMMISSIONER McCABE: Can I add on that. To what extent is the new FASB going to solve some of these problems? You mentioned the FASB rules in the process of being implemented to solve some of these problems.

MR. SEIBEL: I wish I had that number, and I will get you the FASB ruling. It's only two pages. Okay. So I will get you your E-mail and get it to you, but actually also it says that where we have software service and these Cloud-based offerings,

okay, it says that where they acquired a licensing agreement, where there's licensing, and where they're subscription-based per day, per month, per year, but where the customer has the right to take possession of the software, and it's practical for them to take possession of the software, that it is going to be treated as CapEx and actually it's not a -- there is no discretion there.

MR. SURBER: What he's saying is you have the 21st Century -- you buy the 21st Century model under the auspices that you can run it in a 20th Century fashion and, unfortunately, and I think that it's absolutely true, that some of the cases the companies aren't going to allow you to ever not operate it inside the Cloud.

MR. SIEBEL: You could actually run in your own internal Cloud. All you need there is a DM 30 layer.

MR. SURBER: I'm just saying where is the vendor that offers that?

MR. SIEBEL: Where the vendor offers the ability for the customer to take possession and it's

practical for them to do so, then it's treated as CapEx.

MR. SURBER: Some Cloud applications will be very limiting for some of their architecting. From the standpoint for me to operate that internally would be very, very difficult.

MS. BARTUCCI: It's a very empirical question. It's like would it be really ever, and that's the option of, yes, as long as you are willing to move it into your own environments. We have to look very hard at that question.

Are we ever really going to do something like that? In fact, you would have to have a crew to do something like that. I would be reluctant to answer that question.

I want to go back and address one question I think came up earlier. So we are really talking about not so much technical experience, I understand, but what is this going to look like going forward, because it is changing, the utilities of the future. I know we are calling it a lot of different things and I think we have to be able to

plan and engage.

We talked about some things that we thought we wouldn't see for another five or ten years, but they're coming very adverse already in micro grid. We never really thought that we were going to be doing it except as a pilot. Now we have got to do some things and we are already looking at how we are going to implement the micro grid.

First of all, I think we are being optimistic if we think we have 10 years on any of this. So I think it's a matter of figuring out how do we take -- how do we do in-house what we need to do in-house and how do we do it outside the house, what we need to do outside the house.

I think when we are talking the big picture, it's a combination. It's not just one solution, so it's better figuring out -- first you have to find the solution, right, from a technology perspective. It's not about taking expense or capital. It's how do I solve the problem and then how do I solve the problem most efficiently.

First you have to figure out what a

good solution looks like. It really is going to be bringing a lot of different components together. It's going to be a lot of different systems to get integrated to run the grid in the future.

MR. SURBER: I don't think any of us are making these decisions going in on a call basis. I think to your point we are trying to figure out what the right solution is, how do we figure out the solution, how do are we using it a decade or less.

I think the hypothetical in my mind -- I'm not an accountant -- but there is some relief in the value of rules where, for example, when you go to build or move and build the product that all that project work at that point understanding that maybe something that we could capitalize. When we actually get into run the model, when you are operating and pay the monthly bill, that's going to be working outside.

I think again what I would love to do is to be in a situation that, you know, if this is more prudent for us as a company to deploy capital

elsewhere, that's a better use of our capital for the customer and, you know, say the software that's more efficient to deliver as an expense, you know, I would love to have the flexibility to choose that without having to be making that conscious decision of am I having to go impact the ratemaking process.

So I want to get some more real-time recovery of IT costs, because it is on a different pace, and say are the utilities traditional assets. I don't know what that looks like.

I think there's some panelists today that can address that better than I, but those are some questions that I have. I think we just want to have the ability to make a better choice for the customer and not have any impediments to do that.

MS. DALE: I don't think, based on what I heard here today, that it is going to be all one or the other, all CapEx. There's going to be a combination of capital investors that work in conjunction with software. So I don't think it's totally a disincentive for utilities to make the right investment decision, because I think they're

probably going to be a little bit of both as we move forward in these various technologies, a little bit of CapEx and a little bit of OpEx

MS. PALIVOS: Thank you to our panelists for their remarks. We will now break for lunch and resume session at 1:30, if we could give our wonderful panelists a round of applause.

(Applause.)

(Whereupon, a luncheon break was taken.)

CHAIRMAN SHEAHAN: Welcome back. I'm anticipating a very worthwhile discussion this afternoon. To jump start this afternoon's dialogue, we will begin with a conversation concerning the regulatory and accounting treatment of Cloud computing models.

At a time when the celebrating pace of change in the utility industry means that it has less room for error, that a number of destructive forces that declining use of energy, storage, Micro Grids, and distributed renewable generation, Cloud software model offers an option that provides

agility and other benefits and deserves assessment on its technical and functional merit.

Currently, generally-accepted accounting principles do not have specific guidance that addresses accounting for Cloud arrangements, so the utility regulators have no clear road map; therefore, utilities are faced with difficult consequences when they select a Cloud computing arrangement.

Current regulation actually in some cases encourages investments in antiquated technology. To accelerate the goal of a modern energy system, regulation should offer the same incentive to deploy cost savings to software systems that a utility already receives for investing in other technologies or Smart equipment.

To lead our discussion on this topic, I would like to introduce Dr. Ken Rose. Ken is an independent consultant and senior fellow with the Institute of Public Utilities at Michigan State University. Please join me in welcoming Ken.

(Applause.)

DR. ROSE: Thank you. Thank you, Mr. Chairman.

The topic for Panel 3 picks up on what we were hearing earlier this morning. How can we make utilities indifferent to the cost classification of traditional CapEx investments and innovations OPTIX-like software, what policies need to change. So that's what came up this morning.

So I hope we can dig into that a little bit deeper than -- well, they introduced it, and we're digging a little deeper and deeper still in the next panel, the fourth panel.

So first off, let me introduce everybody on the panel and, like the second panel, we'll go kind of informally. I'll introduce everybody now, and then we'll have the discussion. We will go back and forth, and not all the panelists will address every question.

First we have Matt O'Keefe of OPower, who you heard from this morning, and then we'll hear from Mariko Meier, who's Director of Regulatory Studies at Enernoc.

Mariko manages Enernoc's demand

response business at the PJM region, and then we have Lewis Binswanger of AGL, and Louie was named Vice President of Regulatory Affairs for Nicor Gas in August of 2013, and his role is responsible for leading the company's regulatory activities before the Illinois Commerce Commission.

The next panelist is Ross Hemphill, a friend of mine. I should say Dr. Ross Hemphill. He's Vice President of Regulatory Affairs and Strategy for Commonwealth Edison based here in Chicago, of course.

Next we have Molly Mulroy, Vice President and Chief Information Officer of Wisconsin Energy Corporation, and, finally, we have David Kolata, I think he's well known to everybody here because he's Acting Director to the Citizens Utility Board.

We posed questions to everybody, and the first question, which not everybody again will address, but I think it's a good way to start off, is what is the current regulatory treatment of software and why does it present an impediment.

MR. BINSWANGER: I can go ahead and take the first stab at that.

First of all, Chairman Sheahan, thank you and the Commissioners for having us here, especially to talk about this riveting topic right after lunch.

(Laughter.)

But to answer your question, what is the current regulatory treatment of Cloud computing, when you look at internally-developed software, when you talk about internally-developed software, the software right now, when you go through the requirement process and decide on a vendor, is an expense today.

Once you have selected that area you go and build it as a capital expenditure, and then when you operate it, and train, and deploy, that's also an expense, so you have that.

When you look at externally-purchased software, say you are looking at entering into a longer term contract with a license, currently that endeavor would be a capital expenditure. So if we

go out and purchase any kind of license for a CIS system, it's going to be capital. The new standard though is called FASB Accounting Standard Update and Subtopic 350S-40 for those who of you.

As counsel said earlier today, there are certain tests that will go into effect next year, and the two tests I think they were talking about -- this is the new requirement -- is that unless a Cloud Computing Arrangement includes software, meaning both the following criteria, it must be expensed.

So the first one is that we have the contractual right to take possession of the code, and this is the one portion that really wasn't discussed earlier is that "without significant penalty," and "without significant penalty" means also that it's not going to add additional costs to the utilities so that it's not just a matter of saying, yes, you can go out and take custody of the software or take ownership, it can cost us a lot more to do that.

The second thing is that we can

feasibly run the software on our own hardware or arrange to have it evenly posted elsewhere.

So those are the two test requirements that have to take place after December 15th, so that is what we are looking at today.

DR. HEMPHILL: That's a pretty good summary. You are reading off my notes, right?

(Laughter.)

I, too, want to commend the Chairman and the Commission for doing something that's very difficult to do. Instead of focusing on the past, you are looking into the future and trying to get at it. There's a lot in particular in the electric industry that's happening with the transmission underway which you heard about, a lot of discussion about the audit, Utilities Futures 2.0, but it is a transformation.

A lot of new things that are going to be happening part of it is, because of the Smart Grid that's being deployed over the next few years called the AMI that's going to be available, part of it is because of the transformation of other assets

in generation, of distributed generation, and areas like that, so there's going to be huge challenges facing this industry and there's going to be opportunities for customers as well.

So it is very good that you are starting this process by getting ahead of the game in terms of something like this, which I was amazed this morning, coming in.

I'm an economist. I'm not an accountant. I'm not an IT expert. I'm just a lowly economist. I sat there and learned so much this morning in terms of everything, innovation that can come about regarding just this aspect in IT.

So, once again, what we need to do is look to the future and see how can customers benefit the most from this other transmission that's taking place and this transformation in the IT space and as it merges with the transformation that's taking place in the electric industry. How can we get the maximum benefit for customers as this takes place and, as you asked, what can regulators to do to help this?

You talked about impediments. I'm not sure right now I can identify a true impediment looking at how it behaves currently, but I can certainly see that looking into the future there could be some type of impediment that's created if you continue with the same type of regulation that you were using for the past industry, and we have a new industry coming, moving forward, transforming, as I said.

So I think back in my career in terms of one of the first -- one of the earliest things that I did in my career was talk about incentive regulation. A great moderator, Dr. Rose, and I were talking about different forms of incentive regulations.

One of the things that people will say very quickly is, well, all regulations are incentive regulations, and that is true. All regulations is incentive regulations, so you have to look at the regulations that are in place, and how is it practiced, and what type of incentives it doesn't provide for the utilities, and are they the right

incentives.

So you are talking about accounting rules in practice, and you have to see whether or not looking forward do those rules actually affect the decisions of the utilities that result in the maximum benefit to the consumer, and in some cases I think you might have to be a little more introspective and say, hey, we have to put our minds in the place of those that are in the utilities, and what their fiduciary responsibilities are to the shareholders, and how would we expect them to function given the rules that are currently in place.

So I know there's additional questions that will dig deeper into this, but I thought I would just start out with that.

DR. ROSE: Anybody else?

Just on that first question, is anybody familiar with other jurisdictions as to what they're doing? Is Illinois the first to really address this?

MS. MULROY: May I speak a little to that. Thank

you again to the Commissioners for having all of us up here today to talk about this.

In terms of jurisdictions, I do think -- so we operate in four states, and I think, you know, while the ICC has traditionally taken up this topic, and it's certainly a pertinent area of discussion, that we do have other states that have more traditional standards and they haven't really started this discussion.

From an IT perspectively, typically we don't hear what you are looking at. How do you deploy common systems across various jurisdictions? Obviously, there are cost impacts to our customers related to that, and how do we get to a place where we are utilizing and able to have one consistent answer to that question.

Obviously, FASB is driving much of the financial policy that we have, but what does that actually look like in terms of the regulatory aspect as well. We have not seen this in other states at this point.

MS. MEIER: I am Mariko Meier. Thank you for the

opportunity.

I want to add a couple of quick things. So when we look at jurisdictions across the country and across the globe, I can certainly echo what was said in the forefront of this conversation, a lot of places that haven't been considering this as an issue, but a few things that I will point out is that this is something that has come up recently in federal legislation, so the idea that PFCs could be encouraged to look at this as something that's an issue and to consider what incentive may be in place today, because all regulation is basically incentive regulation, and a big part of what's been discussed at the federal level has been this FASB Standard 201505 and I wanted to clarify or build on what you said earlier.

The way that the FASB language has been clarified to a certain extent limits what we can do for Cloud software, and that's why we are in the position where the Commission can really take a lead here, because what the FASB language did -- you know, we talked a lot about how utilities can be

conservative and slow moving. Accountants are really conservative and slow moving.

So when they clarified the language, what they recently said was we're not really going to change anything. We are just going to clarify what's been in place before, and basically what they said was when -- before Cloud software really existed, and this is going to really sound basic to everyone in the room who's an accountant or knows anything about IT, because I know neither of those things, but for the rest of you maybe they will actually make accounting a little more sense -- so what they said was software that used to exist, the kind of software that the 20th Century software that we have been talking about, if you build on premises, that's going to be considered a capital expenditure, always has been and will continue to be considered that, because you are building something up front and building a bunch of money upfront.

The idea was -- the reason why this has been a confusing issue is because that has been increasingly replaced with Cloud software and

typically with Cloud software you are not spending that big chunk of money up front. You are spending a little bit every month for subscriptions or there is some other way to spend that money over a longer period of time.

That's one of the reasons why it's been adopted so quickly because the business is really nice not having to spend all that money today. To borrow much money to spend today, you can spend it little by little over a series of years.

That's great as a business, but what the ASU, FASB Standard really said was, well, unless you can somehow make this Cloud software, which is typically the ASU subscriptions, unless you can make it something that you can put on a USB and actually take possession of and as the person who might buy it actually put it on your own machine, be willing to put it on your machine, which basically functionally means you are de-Clouding the Cloud software, take it off the Cloud, put it on a stick, put it on my machine behind my firewall, then you can have the license, but if this Cloud software the

way we think of it today is kind of stuck being off, and that was why -- that's something that was brought up earlier, and I just wanted to say at a national level that's something that's being discussed.

Unfortunately, the clarification didn't really clarify much. It just kind of said let's stick to where things are, and that is why this is such a great opportunity. We can talk about it in a little bit more detail.

DR. ROSE: I think that kind of leads to the next question on deployment. What will an optimal relationship between the regulatory treatment of different software compliant methodology, whether on-site or in the Cloud, would look like in the future? I think you just spoke to that a little bit.

Anybody else care to address that?

MR. KOLATA: Yes. Thanks again for inviting us today, Mr. Chairman and Commissioners.

At CUB we are very enthusiastic about developments around software. That's why we are

working on data issues within the defense fund.

One of the main reasons why we have been generally supportive of Smart Grids, at least the value of Smart Grid is fully maximized, and we have had an opportunity to meet GEO, OPower, Microsoft, Google, IBM, the list can go on and on, and there's a lot of exciting developments in the space.

I think, regulatory speaking, as a traditional black box, I haven't really focused on that much. Utilities build proprietary systems, and the big question is does it work, and we really haven't done the kind of in-depth focus on how things can be changed that we should do. So I do think that this is an important topic and it needs to be addressed.

I think that having been said, I don't think that -- although the CapEx/CapEx distinctions in accounting are important, I don't think it's the biggest issue, because at the end of the day, I think the biggest issue is optimizing the value of the software to provide for consumers.

I think that sort of inevitably meets you down the road of utility future questions, because at the end of the day, it's what services should the utility run itself as a monopoly but then what services should that facilitate.

We don't want to have a situation where you are picking a winner. What we want to do is have an entrepreneurial platform that allows recommendations, people to compete where it's good for the entire industry, not just picking certain companies -- nothing against any individual company. It's just this is a new space and, you know, it is sort of an entrepreneurial decision for a world that isn't the most entrepreneurial traditionally.

So I think there's a lot of very important issues here and I think they should be looked at, but, at the end of the day, we definitely want to make sure that we are creating a network platform that allows for innovation that could benefit consumers on multiple issues.

MR. BINSWANGER: I would like to add to that. This optimal relationship between the regulatory

treatment of the future, one of the things that we also have to contend with when we go out and make large investments for something like a CIS system I think it comes down to timing.

So if there's this optimal relationship between the Cloud or not the Cloud and regulatory treatment, it would be to allow the utility to be able to address what happens if there is a stranded asset there or not or how do we time it appropriately to wind down an internal development application and then move on to the Cloud and address that more in real-time, because right now if you have a capital investment and it's in a statement to your rate base and then we switch to Cloud computing, there could be an impact to the utility.

So, again, it's about timing. We can do that in light of the rate case or if you have this optimal relationship that there could be some type of acknowledgement from the Commission that that's the direction we want to go.

In the long term, it will benefit the

end-use customer, then let's address it and see how we can unwind it and go to the world.

MR. O'KEEFE: Great. Thanks again for having me up here one more time today.

I do want to address the question about picking winners, because I completely agree, and right now when you look at the regulated utility space, it looks to us as software companies who are born in the Cloud that winners have been chosen and actually are not the software companies in general, given the really fast adoption of all these equivalent histories, whether it's insurance, health care, or banking, or life sciences, this shifts the Cloud much faster. It seems that at this stage it's not currently an even playing the field.

So when you think about the tensions that need to be resolved moving forward, I see a couple that come to the forefront.

One is this idea that thinking about the outcome or the desire to purchase software. Right now, as the example earlier from Mr. Seibel, he presented around a customer service

representative for the software for them. Right now there's a situation in which there are products that produce the exact same result and one is in-house and one is on the Cloud and there are currently incentives for choosing one or the other even providing this as a service.

A second is thinking about what the new realities are for based operations and based service for utilities. As you have invested in AMI, as you have invested in a lot of technologies, there are expectations that are different now for customers in 2015 than there were in 2005. As one example, although it's not necessarily replacing currently in-house software, one thing that, for instance, our company does is provide what we call unusually restored.

What this means is that just like when your flight is delayed or if you are going over your data usage on your AT&T plan, you get an alert from your utility that letting you know before your bill comes out after the month that you are on track towards the higher bill.

This is just a basic level of customer service now for some folks who start to experience this, so that may not have been in the past, but a lot of consumers now expect that type of treatment and that is only enabled by software.

A third tension is understanding where we're willing to move outside the financial accounting rules and advertising rules and admit that there could be regulatory kind of rules that always have been somewhat different and likely can be, but understanding that tension and understanding where we can drop a line is important to us all.

DR. HEMPHILL: The only thing that I have to add is that the optimal relationship I think includes the recognition that it's okay to try to achieve new beneficial outcomes between the consumers and the utilities.

So what that does is it allows -- I think if that's a signal that's provided to the utilities, it allows the utilities to pursue avenues that lead to positive net welfare or the positive net benefits of consumers, because they, too, will

achieve some positive utilities to achieve some positive outcomes.

As a result of that, that gets back to an earlier comment regarding incentive regulations. It's a different type of incentive. It's more of a symmetrical incentive-type regulation, and I think that you need to pursue. It's not just -- again, it's not just for the software. I think it's a lot of different aspects that we are going to be dealing with in the electric industry anyway in terms of transmission.

It sounds like I've got the microphone on. I want to jump on one thing. I want to mention something that didn't get discussed fully this morning, and that is there's been some discussion about whether or not all customers are going to want this. Are we talking about just a handful of customers? Are they going to be looking for things that the Cloud can provide?

So, like I said, I'm not an IT expert, but I wanted to share with our IT expert who was on the panel earlier and asked the question, and that

is how much of what we are talking about in terms of how consumers can benefit going to the Cloud is from individual consumer applications as a result of the Smart Grid?

Some of these new things that we are talking about, these services that will be provided and available, because of the Smart Grid, how much of the utility business as usual that's just going to get more efficient, and I think that it was alluded to, but I don't think it was fully discussed this morning, and I'm just repeating what the IT expert, and what she said is there's a lot, a lot of benefit that can come just from the business as usual by going to the Cloud and properly incentivizing the utilities looking for those opportunities.

MR. O'KEEFE: If I can just add one thing to that that's such a critical point, although the examples you heard earlier were companies that exist specifically to have DSM output or customer engagement output. The software service industry -- the Cloud industry is huge. It could be as simple

as replacing existing human resources software with a new Cloud application where most of the issues alluded to that, and maybe there's been decades away as well.

We are providing examples because we're engaged and excited to talk with the Commissioners on energy decisions, but this is throughout a utility outside of just the outbound communications channels.

MS. MEIER: I am just going to add on that note I completely agree that this idea of Cloud software benefitting sort of a business-as-usual stuff, it is certainly true.

What I also wanted to add, because I have these same comments on my list, which is even when you think about the software that we talked about this morning and the fact that, yes, not every customer is going to want to engage at the same level, what ends up happening is that if the customer that wants to engage, whatever percentage you assume that is, engage and they either lower their energy use or they engage with their utility,

so they're easier to reach out to, which lowers the utility market cost, that doesn't just benefit the engaged customers. It lowers the utility costs overall which then benefits all customers regardless of whether you personally choose to engage, because if there are any benefits associated with the software or if there are lower customer communication costs associated with this software, regardless of whether I choose to give the utility my E-mail or I choose to download the app and change my behavior, the utility is actually saving money which does go into my rates.

So I just wanted to add that to the list. It's not just the engaged customer that could benefit from engagement.

MR. KOLATA: I just have a few more comments. I do think that obviously Cloud Computing Software can provide a lot of business as usual and it takes coordination, and we should look at that.

I do think though the issue of transition which is a very important one because it has to be done carefully unless you create stranded

costs which can make the economy sort of just not good for anyone.

I think it's a very important point to consider, because what we don't want to do is get into that situation again. In other words, if we are going to take a hard look at the IT platforms or utilities, we want to make sure that they're open, that they're built professionally and encourage innovation.

I think at the beginning a lot of it will be more business-as-usual kind of product, not everything, but I do think down the line you are going to see a lot of very exciting software developments, and I don't think that there would be -- in most cases in my own view is that it's not going to be something that consumers necessarily have to think about all that much, but I've got a lot of apps on my phone that I use, but I barely know how they work, and they sort of take over. I think that's more likely the analogy.

So I don't necessarily think I would agree that the notion that most consumers are going

to care about the ins and outs is probably not true, but that doesn't mean that people can't and won't use it and benefit without necessarily knowing why it's working.

DR. ROSE: That's a good point about how you term it as obsolescent where you have to replace the old technology with the new, but the new is advancing so fast that it may be obsolete very soon.

And when you're talking about hardware in particular maybe the Cloud or some of those issues if you want to elucidate on that.

MR. O'KEEFE: Yes. So I thought I would. In response to that, that's the ultimate purpose of software to service Cloud-based technology in the future group. Instead, we update our software every three weeks, send out to everyone that's on our system all of the details.

They are giving me constant subtle changes so we do not have to wait five years to make massive changes and then have one or two years of deployment to that massive change. So nothing is truly future proof but it is much closer to that

reality.

You are paying yearly licensing fees because you are constantly behind the scene creating small incremental updates that make sure that these technologies are not only more user friendly but react to the rest of the world, the consumer, and utilities and businesses interacting with the software.

So this is certainly not the same case. In fact, we would have to have those kind of conversations about stranded investments if they were in the future.

DR. ROSE: It was stranded.

MR. O'KEEFE: I'm sorry.

MS. MEIER: I will build on that point, because I think that there's a big benefit associated with Cloud software in that it is updated constantly, and there are two benefits. Well, there are lots of benefits, but there are two benefits that I'll talk about right now. One is exactly this obsolescence issue that you are not paying a bunch of money up front for an asset that you have to count on for 30

years. You are paying a subscription, right, and certainly you have a contract usually for that subscription.

You can't just decide after 30 days that you not interested, but it's not going to be 30 years. You haven't put the money up front. That certainly helps with that issue.

The other thing is that it's constantly improving and that's something that you don't really get with the traditional software that sits inside your office, right, and frankly that's something you wouldn't get if you put it on that USB card so that you could, you know, comply with the FASB standards, because then it would be in your hardware and somebody would have to physically come to fix it.

I'm sure all of us have worked at a company when the blank system was updated internally, right, and it's been like a two-year process and everyone was talking about the blank upgrades, and then it happens, and all of a sudden the computer stops working and nothing was working

for three days and everybody was like, oh, it's the blank update. Everything's broken.

That doesn't happen with Cloud software, because it's all the time. And if you think about the Cloud software that we are all really familiar with, Facebook, that's Cloud software, and Facebook changes stuff all the time, but it doesn't break with the annual-based update where all of a sudden the website is not working, right.

Certainly there are updates people hate. They dislike buttons, this, that, and the other, but it's not really an issue of the software has stopped working. It's always being updated, and that's really the benefit of the Cloud.

MR. KOLATA: If I could just add a quick comment. I agree completely with the statement that it is the Cloud, but I think there's another issue, too, and that's this does get kind of an easily-in-the-future issue, because utilities are used to doing everything, and vision I think we would want from a consumer's point of view is a sort of open platform

for innovation whether utilities are facilitating that, and certainly that raises a whole bunch of questions that are important and that we are linked with this idea.

We don't get that right at the same time. My fear is that, in fact, if we do it, we should do it all at once. Utilities are used to doing everything.

I don't mean this to be super critical of the IT space. Obviously, it has the capacity of a business model to become a network and to dominate and monopolize that network, and we don't want that either from a consumer point of view.

We want an entrepreneurial platform that really allows people to compete in those areas where it's important for similar values in those areas where utilities should provide this whole service but make sure it's doing it in a cost-effective way and they're not picking preferred winners, but they're choosing the best option for consumers.

DR. ROSE: Does anybody have anything else?

(No response.)

We talked a little bit about some of the issues on the third question, accounting regulatory treatment, so the question stands is can or should the Commission make accounting regulatory treatment for payments made under Cloud Computing Applications essentially the same as traditional in-house software purchase and development costs?

MR. BINSWANGER: Let me address that question, but before I go there, before I came here, I looked at our books, because I wanted to understand when we are talking about this IT infrastructure in the plant at Nicor Gas how much of it are we talking about when we are talking about range.

It is probably in the 2 percent range. It's not -- it's not a huge number. It's not a small number either, but it's one of those numbers that I think is manageable for us to be able to have some type of transmission strategy out of that into Cloud computing.

I think everyone agrees that at some point in time we are all moving in that direction.

To answer your question -- I forgot.

(Laughter.)

DR. ROSE: How regulatory treatment under accounting is improved.

MR. BINSWANGER: So the answer is, yes, I think the Commission should allow some treatment similar to the way we do it right now and there has to be this transition for us to be able to make this investment into a Cloud Computing Environment, because when we go into a Cloud Computing Arrangement, it is for the long-term. It's not going to be for a short-term endeavor.

It's just like when you make the decision to go out for a CIS system, if we went into and someone offered a great solution for CIS, it would be in there for the long term, and we are making that as a long-term decision, so we would think that's one way to address it would be to acknowledge that and somehow treat that similar to the way we are currently creating it.

DR. HEMPHILL: Yes, Be direct in terms of answering the question. The first part of the

question is can the Commission do this? I think that's a legal question.

I've been advised that the Commission can within their jurisdiction, but I'm sure that's debatable. I think a more relevant question is if they can, should they.

I do believe it is something that should be given very strong consideration because of the things that we said earlier in terms of providing the right incentives, but any time you make a major regulatory change like this, I think you enter into it carefully considering the advantages and disadvantages further, but I do believe there's certainly a strong reason to consider it.

MS. MULROY: I would echo the comments made thus far. I think this is certainly an area that we should continue to look at. I do think that if there is an opportunity to implement other jurisdictions to take a look at changes as well.

Certainly, as I stated before, from an IT perspective, when I was looking at how do we

manage costs, the costs to all of our customers, part of that is making investments, say an application for infrastructure, that can be utilized more broadly across all of our utility customers in various states.

We have the consistency from a regulatory perspective. Certainly that makes it much easier as we continue to move forward to make those selections and apply them more properly.

MR. KOLATA: I think for a lot of electric utilities that are deploying AMI, I think that the question needs to be looked at, because I came at the sunset of the utilities, and we are going to need to address and look at and fully maximize the value of the Smart Grid.

So for gas utilities I think the situation may be a little bit different and maybe more of a case-by-case basis that will get very much into questions of timing and stranded costs, so these are the very same type of propositions, but when you are deploying AMI, if you are going to maximize the value of that and really look to the

spirit of what the statute says the kind of network that we want, open decentralized competitive entrepreneurial levels, then we are going to have to address these types of questions, and we should.

MR. O'KEEFE: As I listened to the comments, I was reminded, and it's important to know, there are some similarities to the existing in-house software requirements and the length of time and the length of investment in them. They are longer and they can be long. It's not that there is a long-term relationship associated with going into one of these contracts or subscriptions.

They seem to know that there is customization, there's serious customization done with each client when it's deployed. This is not -- you can just deploy the basic framework, but the whole point is to have a platform on which you can customize things for each utility and their specific customer base. They all interact together and are built on one platform, so alerting the northeast will impact a major utility in the midwest, and vice versa, but there is serious customization a lot of

time on each utility in partnership to make sure these are the right solutions for that customer base.

MS. MEIER: That's a fair point. I didn't mean to imply earlier that the subscription meant that next week you could switch your subscription from one guy to another. There's certainly a lot that goes into building those sorts of relationships and making sure that everything works.

To answer this question specifically, I think what will probably be coming up earlier through the day is less about the specific question should the Commission make improvements the same. It's more about the fact that these are both solutions of the same problem, but today they don't play on the same level playing field, because you can have a Cloud-based solution or a non-Cloud-based solution to a problem. You can build that mainframe in your building or you can have it in the Cloud.

I think a lot of what we are learning today is that there are tons of benefits of having the Cloud, and generally we are moving towards

Cloud-based software generally, but today they don't play on the same playing fields because the incentives are not the same, and so that's really the issue.

It's not this is how mainframes operate and specialize and, therefore, the same must be applied to the Cloud. It's just that they have to be treated in the same way such that they really are competing on the same level playing field that you have to actually have this world where a lot of different vendors are competing, and it's in the best interest of everybody to have that, but today you don't have that same competition and that's really what's driven that.

DR. ROSE: I think a couple of things that were said that reminded me, too, that -- I thought Ross came real close to saying it about this idea of capitalizing versus expensing is an old issue even though technology is new. Every time new technology comes up, that same issue comes up.

So it's really a Philip Ryerson's idea of capital verse expense in that.

(Laughter.)

You know, I guess what I'd like to bring out is is there something in particular here that could help the Commission and other jurisdictions to address what should be capitalized, and I think one of the Commissioner's questions earlier this morning goes along those lines to some kind of guidance on how it should be capitalized versus expenses, things to do with the Cloud.

What's different about this today, so you might look at it different than you would say other more traditional kinds of questions that come up when you are talking about capitalizing.

DR. HEMPHILL: Again, I hope you don't view this as sidestepping the question --

DR. ROSE: That's what I expected.

(Laughter.)

DR. HEMPHILL: -- what I want to avoid is just -- this is a very important issue, and there are a lot of very important issues in the electric industry that we are going to have to deal with in several years, but what I don't want to do is just

focus on this issue and forget about the big picture.

I think what would help put this Commission on the map in terms of a huge step forward in terms of being innovative in your approach to dealing with these issues that they have to grabble will is to take the holistic approach and try to figure out where do we need flexibility in some of these rules. What is it that would be the criteria for moving in a different direction?

I mentioned earlier I think, number one on my mind is how the consumer makes sure that there aren't reverse incentives in place that keep the utility from actually doing things that in the long run are going to positively affect consumers, so I encourage more of a holistic approach as we start to grabble with this.

DR. ROSE: That's fair. Maybe some of the IT people would like to address it, and be as specific as you can maybe provide some examples. Does anybody want to take that on?

MS. MEIER: I don't particularly have an answer.

I guess what you are asking for is --

DR. ROSE: I'm trying to bring those two thoughts together talking one side then another overlap joining in this one, if there's some way. I can't. I don't know much about the technology.

MS. MEIER: So I've been thinking about this issue for several months now, and one thing that I have learned is that I think about the world of people that really understand Cloud computing and the world that people really understand utility ratemaking, the overlap is maybe zero or if there's one I have yet to find them.

(Laughter.)

DR. ROSE: I think we just provided that.

MS. MEIER: Yes. So that's why meetings like this are so important because I can tell you I have been on the phone trying to track down somebody who could help me better understand utility ratemaking who know enough about what Cloud computing provides to get to solutions and haven't found that person yet, so I think that's a second goal coming out of this kind of conversation.

DR. HEMPHILL: I would second that.

(Laughter.)

So I will tell you the story on myself. I was sitting out there and I was listening to the person from Microsoft this morning, and I just recently bought a new computer and I wanted to download all of the Office Products and I didn't have a disk and there wasn't anything in the computer to put a disk in, and they told me I had to get on-line, and I expected to get on line and sit there and wait for everything to download. It just sort of happened, and I was trying to figure out how does that take place.

(Laughter.)

So I'm sitting there listening to the person from Microsoft, and I realized I'm getting it from the Cloud, and it became more apparent to me right there is one of the benefits that you are talking about today. I understand now that I don't have to have it fixed when any kind of glitches and such.

I hope you don't mind that one aside.

MR. BINSWANGER: I might do the obvious thing and turn the question around, but I guess why should they be treated differently is the question that I'm asking at this point.

Fundamentally, we are talking about a lot of things. We are talking today about why they are different might be reasons why you should not allow data in the Cloud perhaps if that's the concern or about the decision about the type of products we want to choose as best, but I don't think it's a fundamental question about whether these are effective tools to meet the needs of the utilities in the state.

So if we started that and thinking about this idea of software for customer service from Salesforce or from Oracle, why does that fundamentally matter when we are thinking about this question? I will come back to that, because I'm not sure that we necessarily have the exact answer to this and that diagram does not touch necessarily, but I'm having a hard time truly getting different -- except for the concerns around just in

general things in the Cloud, not the ratemaking part of it.

CHAIRMAN SHEAHAN: Ken, can I jump in with a question, and, you know, given that that diagram's pretty thin, one discreet issue to sort of think about is how do you account for depreciation for Cloud-based asset.

If you buy a piece of equipment or software, and that's pretty subtle, and there's a period of time and it's obviously a big consideration with ratemaking, How do you think about that question in terms of Cloud computing?

MR. BINSWANGER: You know, I think that the way we would look at it is the way we look at going on contract or a license today. There is a license on our books and we say what is the usable life of the asset and then depreciate that over time.

But to your point, it's not an asset that we have in-house, but the asset is the license itself, so we would treat it the same way as we treat other IT systems, depreciated over that same life.

DR. ROSE: Anybody want to say anything else? Do you have any other questions?

COMMISSIONER ROSALES: I do. Mariko spoke about the fact as well that it is constantly changing and upgrading, so you buy the specific amount of time. That's how you would depreciate it?

MR. BINSWANGER: Yes, exactly. So you would enter into an agreement and say this would be a five-year license that you have and this happens today. I mean, we go out and purchase an asset and we pay maintenance fees on an annual basis and there are upgrades that occur throughout that time frame. We still have that asset. We still depreciate the asset, so we do it the same way.

DR. ROSE: Any other questions?

CHAIRMAN SHEAHAN: What's the typical length of a contract in the Cloud world?

MR. O'KEEFE: I can speak to our company. It varies. It depends upon the type of work you are doing.

I think that the range of three-to-five years is reasonable to state. Some

are on the lower end and some are three-to-five years is ballpark. That said, our product is especially trend deployed and it was cap deployed on the top with the DSM outputs which are on cycles and various prescriptive lengths of investment periods.

When you talk about them as more of a customer care oriented product, we are seeing longer contracts for those products.

CHAIRMAN SHEAHAN: How do you think about depreciation of an asset that's continually being improved with small updates?

MR. BINSWANGER: I think that's a trick question.

(Laughter.)

I think I would tie it to the length of the license, you know, that's because even though it's continually improved, as our assets are today that we own, they're continually upgraded, you know. I would look at it the same way.

I mean, what is the length of that license agreement, that is the life of that asset, until you re-up it. To me, that's the life of it.

DR. HEMPHILL: I understand the question because

we oftentimes in our mind tie it to physical wear-and-tear type concept, and in this case it's not a physical wear and tear, and the beauty of these agreements is that the asset continues its value. You can actually get more value as they continue to make upgrades to it, fix glitches, or whatever.

So what is diminishing over time is the time that you have to use it, and therein I think will be the justification for depreciating an overlap of the agreement itself.

MS. MULROY: I think there are also continual upgrades that are made that are improvements. They're more incremental in nature versus major upgrades. Even today, you will have, you know, sort of 2.1, 2, 3, I mean, so these are about fixes. These are smaller, again, sort of incremental achievements that are being made.

I think you really have to have those major upgrades where now we are adding significant functionality or new aspects of the customer interaction which does have implications today in

terms of whether it's in-house or Cloud.

I think there's some logic there that could be leveraged as we continue to look at product options as well. Those don't typically happen as frequently, just because they then require much more rigorous testing.

Obviously, you want to make sure that whatever it is that you are deploying isn't breaking, so there's a lot more investment that goes into those large upgrades as well.

DR. ROSE: What is the life? You said the life of the assets. That's kind of indeterminate.

I have a Microsoft subscription to Adobe Acrobat where that's 12-years old. It just keeps -- I keep re-upping it, and so that's a completely different software from what I bought originally.

Of course, I use riders all the time, so there's -- and unless there are new upgrades and they hit me up for another hundred dollars or whatever it is, but all of the other times, it's just updating itself on my computer.

So is that the same kind of thing? If that's true, then what is the life?

MR. BINSWANGER: Well, I mean, you have used an operating system or some version of it at some point in time. They say we are no longer going to maintain that version. Sorry. You can keep running it, if you want to, but we are not going to maintain it if anything happens. I mean, it could be cut off. I'm still looking at what is the term of your agreement, your lease in terms of if they changed versions versus if they no longer support them.

MS. MEIER: I think in the Adobe example, I don't know how often they make you pay. Maybe once a year?

DR. ROSE: Several years.

MS. MEIER: So probably your license when you buy you have to pay --

DR. ROSE: The Reader is free.

MS. MEIER: Right. Right. Let's say you pay a hundred dollars. That gives you the right for five years, and then it will include all the upgrades for that five years, and then once the five years is up,

they say, hey, again, in order to get any upgrades you can have the full version you have or you are going to keep it or you need to re-up your contract.

I think that's what Louie was talking about when he said the life of the contract, maybe the life of your contract with Adobe will be five years and then when you have to pay again to restart, you are basically buying the asset again.

DR. ROSE: There's some risk for utilities. You get -- you become kind of associated with one type of Cloud Computing Application, it's going to be difficult to switch to somebody else after that time period is up, so you are not bound but somewhat obligated to keep re-upping for a new software base. You are obligated to keep using that software, the one you initially picked.

MS. MULROY: Because it's a type of business processes, so you basically are integrating those business processes, in the way of the business, so, technically speaking, your ability to change technology is actually very simple. It's all in the business process that goes along with that, that

major investment, and, obviously, you haven't changed management. That can be significant depending on the type of application that you are using.

CHAIRMAN SHEAHAN: Would that be different for a Cloud-based system as opposed to an on-premise? I mean, how would that transition compare? I think that was the question Ken was getting.

MS. MULROY: You know, I don't really think there's necessarily a big difference between Cloud and the more traditional.

Again, what you are talking about is more a component of change with the people. You are talking about the business, so it's going to be the prior investment no matter what, sort of how you manage the back end and what that looks like, which is what we are talking about here really doesn't matter all that much.

DR. HEMPHILL: First of all, I want Ken to quit asking these technical questions.

(Laughter.)

All I can tell you is the group of

people here from ComEd that are with us know more than I can give you anecdotally. It would be a good question to ask the previous panel, but my experience has been if we have a major piece of software that you built and are running and maintaining, and then we find out that we need to do a new version of it, or need to bring in a different one, or build a different one, I have been told that there's a point where you stop making changes. You can't do anything with it for a period of time until we get this new thing right.

My guess is that with the Cloud if let's say you change from one provider to another, that doesn't stop the Cloud that you are using. It continues to be updated as such, but I'm trying to find some way --

(Laughter.)

COMMISSIONER ROSALES: I would like to expand on that, if I could. Earlier when I asked about expanding horizons and speaking of hypotheticals, Mariko, you mentioned you didn't foresee that you could change over from one Cloud to another. Expand

a little bit about that. Why?

MS. MEIER: Sure. Sure. So I was just clarifying a point that I made earlier. So I think earlier I accidently implied that you could get a monthly subscription, in November you could pay one company and do it, then in December you could say, okay, I was just kidding. I want to switch my subscription to another company.

Typically that doesn't necessarily happen with software like that, because it does require a certain amount of customization and that is a fairly large solution that's being customized for, in this case, a utility customer.

So all I was saying was certainly it's easier to switch, and despite being the IT person on this panel, I would not really consider myself an IT person. I'm sure my colleagues in the back are rolling their eyes at me as an IT expert, but I think if you have a non-cloud-based solution, it is much harder to switch, because you have built something on-premise. You are maintaining it with people that's usually performing for you and it is

really a big investment that you have made on-premise with your people, your time, your staff; whereas, if it's a Cloud-Computing Arrangement, it's simply that. It's an arrangement.

So I would say, what's a good example? You know, switching lawyers. You would have an arrangement with your attorney. Switching lawyers isn't necessarily the easiest thing to do, because you have an ongoing history with that attorney. You know, he or she may know about your previous whatever that you have been doing, good or bad, and you kind of want to keep that relationship going, but there's nothing contractually or nothing put on that doesn't let you switch attorneys every month, you could, but you wouldn't really do that. From a practical matter, you wouldn't really be switching your Cloud-computing arrangement that frequently.

DR. ROSE: When does the custom become proprietary?

MS. MEIER: What?

DR. ROSE: When does the custom become proprietary?

MR. O'KEEFE: What I'll say to that is the customizations already exist within the software developed when you make live or when you decide to not make live. The key to them are for customizations are done for utilities. I don't have to answer to that, although I don't think that's typically an issue that we have dealt with, but we can get back to that one.

I do want to say though I'm going to go with the lawyer analogy that the most time-consuming portion of these changes or any start-up of a cloud integration solution is the data integration, just like the most time-consuming part about seeing a lawyer is giving them the update on what you did in the past, the data integration. It's not the deep, technical, you know, software development inside -- the in-house software development or in-house solution being integrated to data so that spigot can be turned off and turned back on with the provider, but a key come be typically because the training, et cetera, you have a little bit of a let down.

MR. BINSWANGER: You know, I would match that. Not switching isn't necessarily bad. Okay. I mean, from a utility experience, if we have invested a lot of money in a system and it's working fine and getting the bills out accurately and on time, and if we just maintain it longer than we have had the Cloud, it doesn't necessarily mean it's good or bad. It's just it's an option.

MR. KOLATA: Just to add, I would agree with that completely. I would say that's true for the utility business. That's clearly business as usual on how it functions.

I think that's probably not the case for consumers facing applications in the future. In that case we want to make sure that we're creating an environment where OPower and C3 Energy will not always compete for customers, and unless there's important data, but there really is a distinction between sort of a monopolistic function a utility has and then things that are more competitive, and drawing that line is something that we can create and raises a lot of interesting

questions.

COMMISSIONER MAYE: Getting back to the ratemaking issues, obviously, I think we have talked about the fact that there isn't that regulatory incentive for utilities to pursue a Cloud-based product.

So what other incentives should the utility -- should we put before the Utilities to explore that option?

It seems as though that is where the great expense to the consumers are. So without that regulatory incentive, what other incentives need to be in to allow us to pursue that route?

DR. ROSE: I think that's for the next panel.

COMMISSIONER MAYE: Oh.

(Laughter.)

DR. ROSE: There's Carl back there. He's waiving his hand.

MR. O'KEEFE: I think that every software company is thrilled by competition, and I think that having a level playing field is a starting point, and that's what we are asking for. We want to be able

to compete with the folks on the other side. I will try to give a better word than non-Cloud-based like dirt-based or something like that. I don't know, but we will come up with something. There we go.

All this talk about the Cloud has made a few laughs after awhile, but it's about an equal playing field and, you know, we are companies that are excited to get down and dirty and create the best products for our customers, and so that equivalency is what's important.

MR. KOLATA: I would agree with that and agree with what Ross said earlier about the holistic approach. I think we are on top of that.

I think that certainly there are issues around accounting, but I think you could solve those issues tomorrow, and, hypothetically, you still wouldn't necessarily have a situation where utilities would be doing everything in their power to maximize the benefits of consumer software. That's because it goes into broader issues that also need to be addressed, and so I think that is an important issue but it's part of the overall

package.

DR. HEMPHILL: It's a very good question and I think that's why we have to pause and think about it.

COMMISSIONER MAYE: I thought it was.

(Laugher.)

DR. HEMPHILL: It's a very good question. That's why it takes a long time to answer.

When I say holistic, I think what we have to do is look at how the traditional regulations have worked, and one of the unfortunate things about traditional regulations it has always been if you are looking at 20/20 hindsight at the decisions that are made by utilities and whether or not they were more prudent and utilities are already stuck, that's a difficult game to play for the industry that is by nature less diverse.

So what you need to do is take a look at things that you like the utility -- how do you like the utility to behave, things that you like the utility to pursue with the mind set that they're doing it because they think it's going to be to the

maximum benefit of the consumers, but try to take away the fear of the ramifications if maybe not all of the things that they pursue are successful.

So there's not only the positive incentive that we provided but also maybe eliminating some of the punitive measures that have gone along with some of the traditional regulations that we don't mind saying.

COMMISSIONER MAYE: Not at all. Thank you.

DR. ROSE: The Chairman brought up something that it seems that we categorize that needs a standard for how the regulatory ratemaking treatment, without answering the question, can we properly characterize what the arrangement is, then that will help inform how you are going to treat the regulatory part.

That's my take away from all of this, just talking about --

MS. MULROY: I think we have been talking about it a lot today, and it's just the other implications of other regulatory agencies setting important rules around the financials and how do you enter the evolution of services really in the business

environment.

Obviously, at the federal level, FERC has rules that obviously have implications across, but given that these -- you know, this was a decision that came from an advisory that came out in April, is there someway to tie the regulation so that as those decisions or those policies are being issued that I'm hoping that we'll be able to take and deal with them as they become available?

Obviously, going through a rulemaking takes time and takes some effort. If there's someway to integrate that, I think that also would be helpful.

DR. ROSE: Well, there's one more question and might be a real short one, and I think we can turn over the questions, so these are yes or no, or no comments.

Should the Commission conduct the rulemaking to provide guidance and certainty to utilities in regard to CCA payments -- re-arrangement payments? Anyone want to take that one?

DR. HEMPHILL: Do I really have to say yes or no?

DR. ROSE: You have no comment, then none.

MS. MEIER: Can we ask a clarifying question?

DR. ROSE: There was a legal issue raised earlier about whether or not there is something that can be addressed, and maybe an attorney would be best to address whether or not the Commission can.

COMMISSIONER ROSALES: Let's not call it Cloud-based. Let's call it cumulous-based.

(Laughter.)

DR. ROSE: Let's take it in a general way. Does some kind of rulemaking procedure make sense?

DR. HEMPHILL: But I worry about rulemaking sometimes that go on for a long time.

DR. ROSE: Nothing's perfect.

DR. HEMPHILL: I think rulemaking would be my suggestion and find a way to get everything out in the open and a decision quickly, maybe some type of stakeholder involvement at the beginning and then quick rulemaking would be my suggestion.

MR. BINSWANGER: I would ask that if the benefit of rulemaking, without saying yes or no -- I'm just

saying rulemaking -- it would give the utilities a full understanding before it makes some of those decisions, because one of the most difficult things for a utility to do is go out and make certain business decisions that we believe is in the best interest of our ratepayers and of our business and that we get overruled or disallowed, you know, a year later, two years later, then we have to take a hit.

So, again, if we had it clearly written out in a rule to say this is how you would treat it, this is how we would accept it, once you make it final, it would make it a lot better on the students to clarify the question.

MS. MEIER: I guess the clarifying question that I was kind of joking about is whether rulemaking is the only way to go, and I think you implied that there is a legal question on what would have happened, but I think there's a question on speed, and I think that's the big question is, as was discussed this morning, the industry is a little behind where the rest of the country and the world

is on Cloud software.

So I don't know what the most expedient and thorough process would be. If there's a rulemaking, then, of course, we would support that, but I ask back to the Commission and the lawyers in the room what the options are and whether they have all been considered as far as the tradeoffs between speed and thoroughness.

MR. O'KEEFE: As a result, I would really appreciate the opportunity to take this conversation and this inquiry and come up with something official that cannot only influence the way the utilities in this state operate but also recognize the leadership of this Commission on this issue already just that we are having today.

As we pointed out several times, in order to us I think to answer this question I think we should think about the quickest and best way to also influence other jurisdictions having yet the time to do this.

There's nothing I think any of us would love more than forwarding on a piece of

information to many of our colleagues across the country who work on these issues.

MR. KOLATA: I think there should be a holistic process that examines these issues, that puts the consumer in the center maximizing, that raises almost a whole host of other questions, and the key thing that I really am intrigued by, but also worried about, is how do we make sure that we get the benefits of an open platform and open network where really the utilities facilitate rather than doing, because I think the utilities traditionally and will always do doesn't raise the same type of issues I think are around things that can better be served by an entrepreneurial framework.

MS. MULROY: I would just echo what everyone has said to-date and have some additional considerations about what that looks like from a policy perspective and what those opportunities look like potentially for other issues in response.

COMMISSIONER del VALLE: I want to make what David just said about rulemaking at this point as an important issue in isolation or do we take a

holistic approach?

Everyone has been talking about the consumer, the customer, the customer, the customer. We still haven't really convinced the customer that there are benefits. Most customers still don't know what the benefits are as we talk about data and the integration of data, and there are issues that customers raise, those that are somewhat knowledgeable about data privacy, security, cyber security, you know, they read about Target and they read about fingerprints, your fingerprints now being out there.

Now there's all kinds of things that need to be addressed, and so do we take this issue and make it part of our discussion about utilities of the future? How will customers benefit from distributed generation? How can we deal with all the issues that are out there in a holistic manner and convince people, the customers, because basically what you are talking about here is how are you going to get paid for this and how are you going to make money off of this?

Isn't that the bottom line, how do you make money off of the investment?

COMMISSIONER MAYE: And then recovery.

COMMISSIONER del VALLE: How do you make money off of the investment, a fair return, right, off of the investment, and so that begs the broader question regarding how will customers benefit from the changes, the rapid transformation that is inevitable that is taking place? That's the big question.

So I would be reluctant to deal with this important issue as well as other issues in isolation rather than through a holistic approach in a bigger discussion.

COMMISSIONER MAYE: So I just want to answer that. I think when I hear a holistic approach I think of -- and our Chairman always tell me that I'm impatient, which I am -- I think of a process that doesn't end, a process -- a conversation which upon conversation, upon conversation.

I think when I started at the Commission a little over two years ago, we were

talking about the future of the utilities. Guess where we are today? We are still talking about the future of utilities. Nothing has really -- you know, there's been kind of nothing put into place, no steps have been taken, firm steps have been taken. Everybody is still around the nation talking about the future of the utilities in Chicago.

We talked essentially about how -- what the benefit is in an expeditious process and why there's a benefit, and I agree, Commissioner del Valle, that there are a lot of consumers still unaware of this, even more so, like time is of the essence.

So taking the holistic approach is like we are kicking the ball down an endless road. That's my concern about that.

COMMISSIONER del VALLE: One of the reasons why we haven't gotten to the holistic approach is because there hasn't been the leadership on the part of the Commission, and I think that with the current Chairman, current membership, I think it is possible, as Commissioner McCabe has shown and

demonstrated by convening folks -- you have been part of those discussions -- that there is I think a movement, unlike in the past, and I agree that in the past there's been no movement.

CHAIRMAN SHEAHAN: David, I wonder if you could -- you sort of alluded to this question a couple of times. I wonder if you could help, you know, draw a clear line between Cloud computing and sort of issues within that discussion on utilities in the future. How do you think about that as a consumer advocate?

MR. KOLATA: Well, I think that the issue is the same whether it's a Cloud solution or it's sort of an in-house proprietary dirt solution.

DR. ROSE: Ground.

MR. KOLATA: Ground, yes. Ground.

(Laughter.)

I think the issue is the same which is that how can we make sure that all these advancements in software can work to the consumers' ultimate benefit, and I happen to believe that a lot more exciting innovations on Cloud systems, and I

think that can provide some of the advances. I'm leaning in that direction; however, you have to look at the individual situation and circumstances.

So I don't know my way around the utility future issues. I would necessarily say, well, there's apparently a difference between Cloud and old school, but I do think that these types of questions eventually lead to those utilities of future questions.

I will say, Commissioner Maye, I agree that, you know, these are important issues that we are building. It's not necessarily either/or, and I think we can start with some aspects of it, and some of these questions are very, very difficult, especially when you start getting into potentially unbundling or a little bit of the distribution system, and figuring out the New York Rev process and start to consider there may be some ways that have traditionally been a pure utility monopoly function and the great advantages of an entrepreneurial framework achieves that, but those are things that we need to address.

The basic question now if utilities aren't doing something, whether there's third parties, how are utilities facilitating it? Well, how are those services priced compared to the risks and reward? All these things are important questions that utilities need to look at.

DR. HEMPHILL: Having said the word "holistic," I want to make an attempt to explain what I meant, and that was not to start some seemingly endless effort to wrap our arms around everything. As utilities, we can't wrap our arms around everything. We don't do everything. That's not what I intended.

By holistic, what I meant is that you start the process instead of using a consistent policy, and one aspect of the policy is that you are looking at the incentives along the way on different aspects of the change in industry, and then address them consistently.

In this case you can start out taking a look at this particular issuance and say how consistent are they and is there something that we can do to correct those incentives in order to

properly incentivize utilities to do things that are going to maximize benefits for customers.

DR. ROSE: Are there any other questions of the Commissioners?

(No response.)

We will take any questions from the audience that anybody has. Yes, sir.

MR. KELTER: Can I make a comment?

DR. ROSE: Sure --

MR. KELTER: Rob Kelter from Environmental Law and Policy.

DR. ROSE: -- as long as you don't take more than seven minutes.

(Laughter.)

MR. KELTER: I think I can do it in less than seven minutes.

You know, I think we do need to keep in mind that there are tools to get the utilities to do innovative new things without giving them incentives, that they do have an obligation to serve and, as we look to the future, we have to figure out the right balance. It shouldn't just be about all

giving them incentives to do new things.

DR. ROSS: That will be addressed in the next panel whether or not additional incentives.

Again, unless there's another question, I'm not seeing any, let's join me in thanking the panel.

(Applause.)

We will break until 3:15.

(Whereupon, a break was taken.)

CHAIRMAN SHEAHAN: All right. I would like to ask everyone to take their seats. This is an incredibly resilient group. All the seats are still filled.

This is our last panel. It will focus on defining the challenge of promoting deployment of new information processing technology and to the discuss realistic options the Commission can analyze for potential implementation. Incentives should focus on the benefits of customers and to the broad utility environment in general.

As the moderator of our last panel, I

would like to introduce Dr. Carl Peterson. Carl teaches economics and statistics at the University of Illinois, Springfield, where he's affiliated with the Center for Business and Regulation. Carl's also an academic affiliate with NERA Economic Consulting specializing in energy and public utility regulations. Carl has held senior positions within the Commerce Commission.

I first got to know Carl about 15 years ago when we were both assistants for Commissioner Hart. So I'm pleased that he's here with us, if you would help me welcome Carl back to the Commission.

(Applause.)

DR. PETERSON: Thank you, Mr. Chairman, and I appreciate the Commission staying all day and waiting for this last panel. I know there's a lot of conversation we have had today and we are going to have some detailed conversation here in the next 90 minutes as well.

The format for the last panel is going to be a little bit different than we saw in Panel 3,

though we will be continuing this discussion concerning the incentive structures and, more particularly, the other incentive structures -- and I use that term - the "other" because I have no other word to use, the other incentive structures that might be available.

So what I'm going to do is I'm going to put the first question to the panel and then we'll just go through and we'll give each panelist about five or so minutes to give their two cents, maybe five cents. We might be able to get a nickel out of it.

Also, since this is the last panel of the day, we would like to maybe give you a chance to comment on the day's approach, and what you got out of it, and perhaps what you want to leave the Commission with at this point.

I will also invite the Commissioners to interject questions at any time. I think it's easier to do that than try to wait till the end and make you lose the context of the question. If you have questions, please interject.

CHAIRMAN SHEAHAN: I have got a few new panelists we can introduce.

DR. PETERSON: I am going to -- having said that, that's the format that we are going to use.

I also want to -- before we get to that -- introduce the new panelists that we have. I'll point out that Matt, Jake and Mariko have been introduced before, so we know them.

Our next panelist is Ed Abbo. Ed is the President and Chief Technical Officer at C3 Energy. Welcome, Ed.

Craig Nelson is next to Ed, and Craig is the Senior Vice President of Regulatory Affairs and Financial Services for Ameren Illinois.

Welcome, Craig.

MR. NELSON: Thank you.

DR. PETERSON: Next to Craig is Jim Jenkins. Jim is the Vice President of Regulatory and Public Policy for American Water, and I am told that American Water is the largest investor-owned water utility -- waterways water utility.

MR. JENKINS: We are still on top.

DR. PETERSON: I'm not sure why I was told that but I was told that. Welcome, Jim.

And last, but certainly not least, is Susan Satter. Susan works as a public utility counsel at the Illinois Attorney General's Office in the Public Utility Bureau.

Welcome, Sue.

Okay. With that, we heard a lot of discussion in Panel 3 concerning the ratemaking approach to try to deal with these new information processing technologies, and so what I'm going to do now is set up a question for the panel and I'll turn it over to Matt first and we'll just go right through the panel.

MR. O'KEEFE: Should I punt, given I have been talking all day long first.

DR. PETERSON: I'll leave that up to you. If you want to punt, we'll do that, but what we want to address is what other approaches, what are those specific targeted approaches to creating incentive structures, and when we talk about incentive structures, I want you to think about that in a

broad sense, not just incentive structures in the sense that we are trying to pay the utilities to do X, Y and Z, but the broad sense of incentives that can be modified, whether those are targeted incentives or a broader sense of incentives perhaps performance-based regulation, or metrics-based regulations or other constructs, you know, perhaps those are programs that the Commission could implement to try and create new incentives or better incentives for the adoption of these new technologies.

Who wants to take the first shot at that?

MR. OSTER: I can start if you want. Lucky me.

So incentives in -- I also want to go to disincentives and talk a little bit about blockers and what can prevent return of blockers on software solutions.

So I can sit here and talk about blocker software and belabor that topic all day long. I won't do that. Everybody understands what makes a software specialist. I want to talk about

the two issues that are worth the Commission's consideration.

The first thing is you have to go forward with rulemaking and continue this discussion. I think the topic that will come up time and time again is security, so your concern about security and data protection aside, and we think about that a lot in EnergySaavy, and I think it was brought up before, and you mentioned before, that is the minimum bar for acceptance in this industry, that you have strong security protocols and that we need to test the utilities, all of our companies, but I want to think about additional issues.

Tom mentioned before that, you know, finance and health care are two industries that live in the Cloud. So I want to go a little deeper I think. What does that mean? So first all banking information is back and forth on the Cloud. I look a little bit into health care. You think about health care in the Cloud, when you are at your doctor's office these days, you walk in. Doctor

meets with you. They're all carrying a tablet of information. All that health information is in the Cloud of your personal information.

If you compare the health care information versus the amount of kilowatt-hours used in a house, do you think the information you have is more vulnerable than your average customer? I'm not saying that data processes of energy isn't important, but think about the entries that happen in the Cloud.

When you look at prescription services, you have doctors transmit their prescriptions. Almost all of that is in the Cloud. Look at DataPath. Surstrip is one of the biggest companies. They process more than one billion prescriptions over the Cloud. That's prescription drug information.

So when you think about security and people start worrying about security, put it into perspective, the other industries that have moved into the Cloud and what that has meant to the Cloud.

With on-site solutions, we talked a

little about this, but on-site solutions they grow old with age, patches and outdated security systems.

Before I joined EnergySavvy, I worked in the government. As a reward for my service, my data was hacked. I was probably looking at the expiration date. I had this service and all kinds of paperwork that monitored all my information, E-mail once a week, tells me whether or not there's something I should look at, something I shouldn't look at, computer password which I couldn't figure it out, called it in and figure it out takes a lot of time. It's a pain, and I have to deal with it.

OPM's Security breach was a result of an outdated software system that's on-site. OPM was 30-years old. It fall out of date and they couldn't even bring the software system up to date with a current third party. They couldn't do data inscription. They couldn't do multiple on-line applications. They couldn't bring the software system up to date because the system was so old.

That is the type of thing we are talking about when we talk about private and data

protection issues. We have to consider comparisons, so what happens if we lose control of our data ourselves, there's ramifications on both sides. On-site just because we live behind the firewall doesn't make it more secure.

I also think of the OPM protection handbook on technology information. That was all it took to break into all that information. So as you go into this thing, that would be one blocker you hear time and time again is security, so I want to put that out there as consideration. On-site doesn't mean better protection.

The other thing I'll say in that space we count on utilities to deliver electricity and natural gas, of course, and they're good at that and I want them to do that. I don't want Amazon to deliver my electric, but I do want Amazon to take care of my web services.

We use Amazon's web services all over the place and they are professionals at security systems, and I am not, and utilities aren't, and so we should have utilities to do what they're good at,

but let's ask the Cloud software expert to do what they're good at it. They understand software. They live and breathe software security systems. They have security experts.

So if you are tracking security, remember the drug industry is doing that. On-site is no more safe and, you know, let the experts do what they're good at, so they are good on security.

The other topic I want to raise while I'm on this issue, I think the Commission should consider is think about the cost of value for private software systems, and before you to start looking at utility procurement of Cloud-based software, there's multiply models of software that's out there today. There are also multiple models of software services.

We talked a lot about Salesforce today. Three of the four slides showed Salesforce. Salesforce is a horizontal software company. They built products that would work for whole industries. It's customized for different security issues and in their company, like ours, they are more integrated

and they're built to serve the utility industry and the energy industry, and so their purpose is they are built to draw software solutions for the utility industry.

When you take a horizontal service, you have to customize it. The cost of value is longer and the customization is cheaper and contract hours longer and the result is software that's on-premise.

When you take a vertically-integrated solution, you take a company which is nothing but a supply industry and you build a better solution, you get cost out of rate base.

The Commission is considering overseeing procurement of software solution as capital expense, that's another thing to consider.

So those are two issues, security, cost of value raised in the Commission today, incentives, other things to consider, that's what you got, and I'll leave it at that for now.

DR. PETERSON: Thanks.

Who wants to take another stab at

this?

MS. MEIER: All right. Okay. Hi, again.

So what I thought might be useful is to walk through a little bit of kind of what I've heard today and to provide a little bit more commentary on those other things exactly, and then I don't think that it's really -- even really necessary to think about what the benefits of Cloud software are over non-Cloud software.

The fact of the matter is both of these kinds of software solve the same problem and, you know, I think many of us in this room will say that Cloud software is probably better, but the fact of the matter is both software solutions do certain problems, and the way that the status quo is set up, one is considered a capital expense that can get rate-based and one is considered an operating expense and that cannot, and that makes the playing field not level and to consider that pretty arbitrary, right, that this is where you are storing your data, whether you are storing it on-premise in your building or storing it at Amazon's web services

location one mile or a hundred miles from here, it's going to impact how it's treated from a regulatory perspective. It's going to impact your ability to earn. It's truly arbitrary.

I mean, I was talking about kind of like the situation you can renovate your green chairs but not your red chairs. It doesn't make a lot of sense. So we are -- I don't even think it really -- you don't really need to think that Cloud software is better to want to solve this problem. You just have to realize that both Cloud and old school solutions should be competing on the same playing field. I think that's really what today is all about.

We appreciate the opportunity to be here and in particular bring together the minds that know about Cloud software and the minds that know about ratemaking and maybe find one person who will know about both walking out of here. So maybe I should re-assess what ratemaking. That sounds like a fun game plan.

So, on that note, I think the question

that was brought up earlier was what are the solutions, what are the solutions that are out there, and one of the answers that I can give you there aren't any, because we are ahead of the curve, and that's great that we are starting that conversation in a broader way before other commissions and we're really able to bring these kinds of issues up, and that's really exciting.

There are broad solutions that are being discussed, so the two that are on the top of mine, and probably for most people in this room, is New York Rev, that was brought up a lot, and then the UK way of looking at it, the Reo. You heard that term is another way that people are thinking about this.

I'm not -- one I'm not going to talk about in a lot of details because I don't have much time, but also because I don't know enough to talk about it for too long, but New York Rev is doing that holistic approach that we talked about on that earlier panel.

While I am extremely excited about

what New York is doing, part of the reason why I brought up this concern or this question between being holistic as thorough as possible and time, because New York Rev is going to be a long run, and it would be cool on the other side I think, but that's not really the most expeditious solution necessarily.

Somebody asked about other jurisdictions, so I will just quickly talk about the UK. The UK system the way -- what they're trying to do is to make their utilities indifferent between capital expenditure and operating expense, because what they're seeing is that this differentiation between what is CapEx and what is OpEx is starting to get messy, because of the software, because of a lot of things that are changing.

So, you know, 20, 30 years ago it was pretty clear what capital expenditure was and what OpEx is. It was pretty clear, but now not only software but across the board you are seeing these lines get messy, and if you talk to an accountant, they'll tell you the FASB accounting board is really

spending a lot of time saying, well, this one's capital, this one's not, and, well, this particular situation will do this and it's getting really complicated.

In the UK system, they're saying it shouldn't matter. It's not about whether something is considered CapEx or OpEx based on accounting rules. What we need to do is put incentives in place to best benefit the end user, and this decision between CapEx and OpEx doesn't really matter.

Both of those are huge undertakings. There are huge differences from the status quo, and I'm certainly not necessarily suggesting that we do something that broad-based, but there was a question brought up earlier on how other regions are thinking about it, and I just wanted to make sure those two were brought up as well, so I will stop there and answer any questions.

MS. SATTER: Well, I would like to respond.

DR. PETERSON: Sure.

MS. SATTER: Thank you. So the question is what

are the incentives to do the right thing, and so how do we define the right thing. That's the big question, I think the fundamental question.

I am going to assume, for purposes of this discussion, that Cloud solutions are less expensive, more reliable, and more secure than the current software that is on the premises. I'm going to assume all of those attributes.

So when we look around, we say in the financial industry, in the health care industry, Cloud computing has been adopted under the existing accounting rules; in other words, when the software and IT work becomes an expense, no longer requires capital investment, it is treated as an expense.

So my question then is what happens to your capital budget when you are using fewer dollars for IT and you are not using those capital dollars for IT.

Now let me go back. What is the right thing? For a utility, particularly like electric utilities, and gas utilities, and infrastructure utilities, the right thing is to invest in the

infrastructure, invest in the pipes in the ground, invest in the distribution automation, invest in meters, if that's what the General Assembly directed you to do.

So what I'm hearing is that we have this opportunity to shift dollars from an IT possibly sinkhole to hardware in the ground infrastructure that will make our system more reliable, more resilient, more long-term. It's an opportunity. It's an investment under the current accounting rules, because what organization does not want to preserve and use its presumably somewhat limited capital budget for core activities, for core competencies.

So let's say a utility recognizes, yes, if I go to Cloud computing, it will be a smaller expense. It will be a smaller cost to the public than our current situation. That's good for the public, but we also are freeing up money to invest in our core work, so now we have got -- we have replaced poles. We have replaced circuits that need to be replaced. We have done work on

substations, because we are not spending the money on things that don't really require a lump sum investment.

So why is something classified or treated as an expense is being treated as a capital expense? Okay. So an expense is an ongoing expenditure compared to an investment or capital expense, which is a big lump sum.

How do you recover that big lump sum? Usually over the life of the asset. Well, we have been told that the lives of these Cloud assets are different. They're just fundamentally different, and that's what makes them attractive. That's what makes them least cost, and that's what makes them something that you think you want to do, that ends with an actual profit, that allows you to free up money for its core function would want to do.

Accounting follows reality. And if the reality is that there's no lump sum investment, then accounting should follow that and not try to create a lump sum capital investment when one wasn't made, then you get questions, like the Chairman

raised, well, how do you treat the depreciation? What's the life? What's the appropriate return on something that's going to be changing all the time? Do we want to encourage things like flexibility? You know, this year maybe something got a new Cloud function. There's all kinds of things that really characterize this expense at this cost as an expense.

Why are we here today? I think there's a very good reason. The Cloud computing function appears, from everything we have heard, to be unique to the IT process over time. It's something new. It's what we are doing in the future with all this distribution adopted. It makes sense.

Utilities should seriously consider it on the basis of prudence. Utilities make prudent investments; in other words, their investments and their expenses, if you will, should be least cost. They should be most effective, and if it turns out that Cloud computing makes the most sense, and we are having this discussion, so that that's kind of setting the context for utility investment, maybe we

have^ we've missed the ball, because now utilities are thinking, you know, there is an area that we are learning about, and this is a direction that we will go on simply prudence and for the benefit we will reduce our cost to the public. We will increase our capital expenditures, our capital budget for our core competencies.

So I suggest that trying to fit Cloud computing as an expense into the capital investment box is counterproductive, and, in fact, treating it as an expense provides an incentive to utilities to spend on its core competencies, and that's what we want to do, and that would be the goal that I would suggest that we pursue.

DR. PETERSON: Craig.

MR. NELSON: Thank you.

I just want to address what Susan said and I agree in part and disagree in part, and I want to amplify I agree in part and disagree in part.

Let me first address the policy direction. I think we already have a good policy direction. I think back to the legislation that we

had just a few years ago, the Smart law, the Infrastructure Modernization Act. We have already got the direction from the policymakers in the state that we have Smart Grid and we are going to modernization. We already know the direction that we have.

Everyone in the room thinks that we should be examining Cloud computing and going that way which makes sense when it makes good business sense and good sense for our customers.

So -- and, Mr. Chairman, Commissioners, I think we can take a step in the right direction without solving the whole ball of wax. I think we can take step by step moving in that direction and I suggest specifically a way of getting there within my five minutes I hope.

Well, I think this can be a win win for customers and utilities. Clearly there's benefits for customers. If their Cloud approach is the least cost approach, that's wonderful, but if it offers services to customers beyond what they have, that's wonderful. Those are wins for them, plus I

think what we were proposing in capitalizing some of these products and expenditures is a benefit for the customers as well.

And I'm talking about not everything, Susan, just the up-front costs, and so instead of expensing the up-front costs all in one year and the formula rates charging our customers all in one year, I then agree we should capitalize them, as the others have said, and amortize them, and depreciating them over the life of the contract that we are talking about.

So what do I mean by up-front costs? I want to be specific. This is past the last end, I mean, the connection costs, this new software, so new systems that are coming, the customization costs, the loading the data, playing with the data and testing the data, all very significant costs up front.

In fact, you know, when you are analyzing what the costs of the contract, the Cloud computing contract should go with the term, let's say, five years, you can even pay for the expected

updates up front and see if you take a significant amount of the cost of that contract and paid more of it up front, and then we reduce the month by month and still capitalize a good portion of it.

FASB got it wrong. I'm an accountant by training, CPA long ago, but their fix is not a fix. There's no way we are going to be able to take this big data thing that's out there and put it on our servers and run it. There's no way that Cloud computing companies are going to let us run it ourselves either. That's a joke. So it's not a fix. I'm suggesting a compromise where up-front costs are capitalized in monthly ongoing costs or expenses.

And, specifically, I think that the up-front costs should be intangible assets. There's a category, and I'm talking about intangible assets, and they automatically go into plant and equipment and become part of rate base, the up front, too, I'm talking about.

And, Commissioners, I think you have various options. We talked about rulemaking, and

that would be my top choice. I think that buying a time limits makes sense, but instead option two would be possibly a workshop, followed by a short proceeding, followed by an order in the direction of this on a long-term perspective trying to solve the utility of the future. It looks at stakeholders to draft legislation.

I think the other two are better, because they are short, simple steps to solve this particular problem, and utilities, as they're looking for options for software, should do the right thing, and we are.

I think -- Tom, I think we got eight or 10 Cloud contracts already that we have moved forward and we are looking toward to a significant one, and so even without this incentive, we are going to do the right thing, but from a business perspective and from a policy perspective, it just makes sense to incentivize people to do the right thing.

So I think these up-front costs make sense from an accounting standpoint, regulatory

standpoint, and from an incentive standpoint, to move us in the right direction toward the Cloud when it makes sense. That's about it for right now.

DR. PETERSON: Ed.

MR. ABBO: If I could comment on this, maybe just take a step back as to why is the Cloud really needed here, and we talked still about the same functionality being available through on-premise software and Cloud software.

If you really take a step back and look at this a little bit more holistically or strategically, the benefits of the values associated with grid modernization were basically putting Smart meters in place, sensors on the distribution of transmission generation equipment.

The value comes from actually analyzing those data more broadly than we currently were looking at the Smart meter data in conjunction with the transformer substation data, transmission, syncophasors, generation equipment, trading systems, et cetera. That's where the actual value comes from.

And given the industry, Mr. Siebel talked a little bit about it, the volumes of data that need to be actually ingested, correlated, analyzed, the only cost-effective way to do this is actually to have computing Cloud structures. These are computing structures that essentially scale up and down and cost efficiently if you are using them or not, and they deliver the value as the grid modernization grows.

And so the question is, you know, what is the value? And what we did, and Mr. Seibel alluded to, is we have actually worked very closely with the Kensing (phonetic) Company on average the order of 2 to $300 per meter per year, for customer meter per year, and the value to the consumer, as well as to the utility, in running a more efficient operation in essentially reducing line losses, unbilled energy all across the entire business process of the utility that can be derived from this modernization that really needs Cloud computing to make it happen.

So I think that's another kind of

angle on why are we here, why are we talking about Cloud computing. It's really an enabler to unlock the value as an investment that we are all making.

And, you know, similar to some of my colleagues' comments on, you know, why is Europe able to move more quickly, we talked about the UK system and the Reo system which has to do with allowing the distribution of the utilities, essentially innovate and invest in innovation unlike the value of grid modernization.

Mr. Seibel talked about Enel's Global operations there where they're essentially deploying ways to manage the reliability using Cloud computing and software. They're moving very aggressively to the Cloud and doing so in programs that basically are 18 months to 36-month programs.

The reason that they're doing that is because they have incentives in place that actually deliver business value for their customers to deliver values in their operation and they gain from that.

So it's kind of a performance

incentive to actually move and move quickly, and I think the best -- you know, again, the reason we are here, and I applaud the Commission for bringing us all here to discuss this topic.

DR. PETERSON: Thank you.

Jim.

MR. JENKINS: First of all, I really appreciate the opportunity to be up here and to discuss Cloud computing. Often water is part of this low technology-type utility sector. It's actually not the case. I mean, we are looking at Cloud computing. We actually have Cloud computing deployed. We deploy it right now in the areas that are outside what we call our "crown jewels." That's what we call internally is our crown jewels, whether it's our customer information system, billing system or our accounting system and our asset management system. That does not mean that we are not looking at it in terms of security and pulling capital efficiently.

We actually got it deployed in things like our account management. We have got it

deployed in self-service. Any time we do any type of training, collaboration, we are on the Cloud with that, and we are even looking at from the source to actually out of the distribution source, all the type of monitoring devices in terms of source water. Source water is to our sewer plants.

We are also looking at distribution with utilities, and we have got examples of that. We operate in 16 states and we got examples of that in various states.

I would say that I thought Craig addressed, you know, the subject and, likewise, with Sue, is really important. I think you raised some really good points. It's that we want to do the right thing. We need to do the right thing for the customers.

What Craig outlined, these up-front costs, as I was sitting here listening, it really get into things that we tackle as an industry across this Commission for many years, as well as others, is energy generation.

If your current costs do benefit

customers through multiple periods, then up-front costs -- it doesn't make sense to try to load it all in expense. That's where the accounting got it wrong. The accounting is dealing with open market-based businesses, not really focused on regulated businesses like we have, so I think that's one of the things that we can do and certainly the Commission has authority to do that.

In terms of our company, I even went back and started asking questions that immediately popped up to us in terms of real integration across up front that you have got to go through with that, and then -- I don't want to lose my time -- there's other innovations that are out there and around the country the electric industry that we looked at, and those go to capital and they go to both expense.

So if it's in the public interest and you are able to do that to actually bring benefits to the customers, those are some tools that we have in the tool box to look at as well.

MR. O'KEEFE: Great. I'm glad I crossed out about 15 things I was going to say. First, I think

it's really important to underscore some things Craig said that the value of the Cloud is not worth talking about fundamentally today.

As utilities across the state and across the country are deploying a lot of solutions that exist in the Cloud, and that operate Cloud-based software solutions that already exist, the question today is fundamentally about why is there this disparity about how solutions are treated.

I think we heard a lot of interesting perspectives on that, and I think that the way that our company set up our payment agreements should not necessarily be a fundamental question. It's an important thing to consider, but the outcome, and the purpose of the contracts, and what the product is being provided, should be more important, and let's find the alignment there first between existing solutions and those that are Cloud-based.

To go back to the question about other jurisdictions what they're doing, the UK is really a good example. New York Rev is looking into that as

well, but one of the things that I did want to note is that just another thing that some states are doing is they are allowing you to generate revenues from specific types of CapEx subject to jurisdiction such as United Management Program that are using software as a service. That's one example, but it's hard around an office where we have dozens of employees that think about this thing all the time and working in 35 jurisdictions. We didn't come up with examples of that.

DR. PETERSON: Thank you, Matt.

Any questions from the Commissioners?

(No response.)

Any questions from the panel?

(No response.)

Does anyone want to ask someone else a question or comment on what's been said?

MR. OSTER: I just want to make additional comments to the extent a little bit on what you said and what Matt said.

We talked about utilities and future growth up here a couple of times. I sort of make

the leap between Cloud software utilities in the future and shared learning, and I'm not going into the accounting part here. I'm steering clear of that.

When we install on-site software at a utility, you know, changes are made, patches are made, improvements are made, customizations done, and all of those learnings and all of those best practices are made on that software, but they can't stay on that software and they live with the utility.

With companies like us, who do a Cloud-based software system, Matt talked before about doing three week-improvements, my point being, I mean, it could be six months of improvements being made across different jurisdictions. There are 35 jurisdictions. They're not that many. You have got us beat there, but what we have learned in New York as a result of working with utilities in the Rev, we bring to Illinois, the only way the industry is able to move forward for utilities of the future is if we do it as a shared experience across the industry.

If utilities in New York are moving toward Rev, we need to take the best practices out of the software system and bring into Illinois.

If you continue to rely on on-site solutions, you lose a lot of those best practices and shared knowledge, and utilities have to make the choice individually.

I'm not saying every single system needs to live in the Cloud. Utilities need to make those decisions based on what works best and what doesn't, but if we don't move toward Cloud-based systems, we lose our knowledge of shared experience we are going to need as utilities of the future. That's what I wanted to address.

DR. PETERSON: Craig.

MR. NELSON: I thought of something else. I think I'm amplifying what either Ross or Louie said, and it's the risk adverse nature of a utility and so on. And if the Commission does want us to move in the Cloud computing direction, I can't understate the importance of bringing that policy guidance enlightening and getting utilities to clarity

certainly and I'm feeling better about moving in that direction in a big way.

So if there's clarity -- if there's clarity, the best direction we should be heading, and there's clarity how we handle the accounting ratemaking purpose, it makes our conversations with our board, senior execs a lot better as we move expenditures in that direction.

CHAIRMAN SHEAHAN: Craig, you may have answered this question, but I was trying to think about Susan's point, and I think her point essentially is, and correct me if I get this wrong, if this is such a great idea, why aren't you doing it on your own and why don't you then just use the savings to invest in something you could get a return?

In the private sector in, you know, a start-up context, a hundred percent of the businesses are using Cloud. The rate of adoption is growing exponentially and the utility space is very low, so there's a real disconnect, and I'm kind of curious as to what, you know, your responses are.

I mean, why is there that disparity if

the equation is as simple as, you know, if this is such a great idea, why aren't you doing it already? Why aren't you doing it?

MR. NELSON: And we are. And just a couple of examples, unrelated to AMI, all that customer data software that we have acquired, that's called Clarity Software, the customer access their data so they can use the Cloud approach to access their data and then push the green button, if they want to share their data with others, and all of that, that's something, and I think there's seven or eight others that we already have in place.

For one big thing we are looking at is a workforce management system that does everything human resources and we think the Cloud options, and that's probably the direction that we'll be heading, but we are very risk adverse and slow in other critical systems, and the point is when you invest in a customer system, you know, it cost a hundred -- I think we wouldn't be building another customer system, let's just say that's Craig Nelson's speaking, but we are talking about $200 million

creating a customer system. I don't think that's going to happen.

I don't think there's a Cloud solution out there yet for utilities that can handle the way we are required to do billing by the Illinois Commerce Commission, and then there's great concern from an operation standpoint just for managing storms and outages whether we should be tied to the Internet or not or whether our own systems and our own communication network is superior, so that if the Internet goes out, we can't respond as well as we could with our own system, so going slow.

On our customer system they are going slow on these. Our core systems, we are updating the systems, and we are moving in that direction.

As far as the capital investment, we have already invested capital way, way beyond what we have recovered in depreciation, and I would like to get the accounting and ratemaking right.

As you said it more eloquently than I did, Jim, these up-front costs should be spread over the benefit of the contract. They should be focused

on the customers always. In the first year, that's what we are suggesting.

Let's identify the up-front costs and capitalize them as intangible assets and spread them over the life of the contract. It's not that different a concept, and I think we can identify what those up-front costs are and they should be over the contract.

COMMISSIONER ROSALES: Craig, you bring up a good point. I want to go back to Jake, because you mentioned about the financials, banking, health. What happened at Anthem? It was such a major breach. So if we are talking positives, we also need to talk about how to answer when people ask would Anthem have occurred, because it was in-house and not out-house? What I'm looking for what if it goes out?

There's a lot of questions that I think regular consumers are going to have when this comes up, and then I think there's so many good positive questions, but we also have to make sure we can we can answer all those questions.

MR. OSTER: I am certainly not a technical expert. I haven't looked at every data breach, but that happened to me personally.

MR. ABBO: When you say what if the Internet goes out, I don't think that's an experience that we have had.

COMMISSIONER ROSALES: I'm just talking about what Craig mentioned.

MR. ABBO: I'll handle the technology updates, regulatory, software development, but, yes, a lot of these breaches that you are hearing about are actually intrusions into corporate data centers, the Targets, and the Anthems, and even the OPMs.

First of all, Anthems, basically these are intrusions into non-Cloud data centers, and the Cloud systems that Google run, Amazon run, and others like those, basically have invested very heavily in securing their systems to the point where their investments are substantially larger than the investments that most of these corporations individually make.

To that thought, for example, like

Google and Amazon are constantly looking for intrusions every single second of every single day. If there's intrusions, they're on it immediately. That is a huge investment on their part.

The problem is that OPM, Anthem, and Target can't make those investments. They can't afford it. So they're at a point where they really need a very secure system. Google, Amazon are much more secure than we can secure the application systems behind corporate Target.

COMMISSIONER del VALLE: Has there even been a Cloud breach?

MR. ABBO: Not to my knowledge.

COMMISSIONER del VALLE: It's possible?

MR. ABBO: It's possible, but they are always looking for it every second of every day of every -- they're basically on it.

COMMISSIONER del VALLE: But the data.

MR. ABBO: You know, is it possible? I can't hypothesize as to whether it will or won't. There are degrees of security that they can enable part of it, which is being off the internet completely, so

you disconnect critical infrastructure --

COMMISSIONER del VALLE: I guess we ought to have all governments -- all members of the government, the federal government, going to the Cloud, then we won't have a problem.

MR. ABBO: Certainly there's a lot moving to the Cloud, and if you look at the analysts' forecasts, 75 percent of all the data will be in the Cloud by 2020. Last time I checked, 2020 is like around the corner, four years from now, and so 75 percent is a substantial amount of computing occurring in the Cloud.

The other comment I would make is we have some fairly small software technology companies represented here. All our development I think is basically Cloud-based, but I ran applications on Oracle not that long ago and almost the entire investment is basically being made in Cloud systems, so I think any one of these situations where you might be finding the current customer systems, but the next generation will be a system that is industry or architectural that runs on a Cloud

infrastructure.

That's not just small companies, it's also very large technology companies, whether it's Oracle, or SAP, or other providers in the market. They're basically architecting and investing 99 percent of their innovation dollars on the next generation technology, so I think this is inevitable.

COMMISSIONER ROSALES: I agree. While I'm trying to answer my own questions, and because I know this is how the newspapers would put this in print, but to me it would be at that point obsolete because you are already uses the Cloud and there's enough data out there where it's already here.

The question always comes up it's years and now we are moving into another level, but the question is always going to be there, and especially when we are talking about utilities. If you lose Target, you know, you are upset. You lose your power and the grid goes down, that's a big problem and that is the result.

MR. ABBO: I think that, again, this control

software is basically localized, and it's not in the Cloud side, but I think that there's a lot that can go to the Cloud, and certainly infrastructure control software doesn't belong in the Cloud. So there will always be embedded software and hardware technology in control systems that are not in the Cloud and, you know, there is a lot that can go into the Cloud that's enormous with business value.

Again, the hardware and software division in terms of buying capital, a lot of that is -- a lot of those lines are broad. In order to get value in this process, there is a hardware end and a software end, and you don't have to look very far in industries like the transportation or taxi industry where Uber has a software-type model and they haven't replaced cars, but it basically is able to get a model and how you treat that, capital expense or operating expense? That's beyond my pay grade, but Uber is starting to become very tied to the software, hardware processes.

MR. OSTER: I want to point out what you said, and maybe answer a little bit about the Chairman's

question on how do we move towards Cloud-based software and the experience with a utility we have been working with and talking about procuring software.

They hired a consulting firm to help pull out and understand the landscape of software updates, and they said to the company consultant we really want on-site software. We want this looking behind the firewall. We want something that's on-premise solutions, and the consultant came back to them and said it doesn't exist. If you want to monitor what you want, you have got to go back to the Cloud, and they're coming to us and we had a conversation.

That is the transition that is starting to occur in the industry. That is unavoidable in that, as you said, for a company you are not building modern software, so a little bit of how do we get there, how do we do this, as far as health care, finance, the industry is starting to move up on its own agenda.

MS. SATTER: If I could just add a few comments

to the Chairman's question, I think that both of the utility representatives on this panel and other panelists have noted that utilities are using Cloud computing for various functions, and I think one of them in particular is in the energy efficiency space, and, as far as the incentives go, energy efficiency is treated as a separate mandate.

So there is an incentive mandate to procure energy efficiency in a special cost-of-recovery mechanism for efficiency services and those services are already taken, especially I think well suited to Cloud computing and, sure enough, we are seeing Cloud computing there.

The other thing that I wanted to mention in terms of cost recovery and incentives is that in Illinois we have a unique situation. That unique situation is the General Assembly passed the infrastructure bill, the Smart Grid Deployment bill, which has a special cost recovery mechanism. Every year the electric companies are mandated to spend in certain categories. They recover their costs. They recover their investment costs, and they get a

reconciliation of costs that maybe weren't recovered before. So all of the regulatory delay and the risk associated with regulatory delay have been essentially squeezed out of the process in Illinois.

So Illinois is unique. Whether utilities are mandated to spend them, in other words, what things have the General Assembly, our policymakers, said? Yes, utilities, go forth and do this. We think this is important. And I think the utilities were on board with this. This is not some mandate, for instance. The things include cyber security for data, platforms to accept remote device upgrades, internal memory, additional storage capability functions, services without the need for physical access to the meter. These things are the law today.

So, to the extent that Illinois law provides incentives, I think all we need to do is look to Section 16-108.5 or maybe 108.6 which is essentially the Smart Grid element.

But in terms of integration costs and how they should be treated, I think it would depend

on how they're characterized, how they're identified, but under the Smart Grade law, if there's an annual expense -- not that this might be just for ComEd; it might be a different number for Ameren -- if there's an annual expense that's over $10 million, then the law says you can't tie to this year, so that question has kind of already been addressed in Illinois law.

In 2011 there was a lot of debate about this law. I think the utilities put a lot of energy into writing a law that provided the kinds of incentives that they felt they needed to make these investments. So Illinois is really unique and it's really in a good position to adopt these technologies, and they have been adopting them, you know, when it makes sense.

The last comment that I want to make has to do with accounting and the FASB, and that is that the FASB has recommended a slight change. I recognize it's a slight change in how you treat the expense capital question, but that rule is a national rule and it's used not just by utilities

but by all businesses for account reporting purposes, and I think that there's some value in recognizing that consistency.

So if there is going to be a change in the treatment of that particular expense for one state to do it without regard to the national rule can create some problems I think for utilities, for reporting multi-state utilities, but for reporting as well. So I would just offer a caution on that.

I think we have a lot of treatments already in place, a lot of processes already in place to embrace change and to protect the utilities and limit the risk that the utilities are adverse to.

MR. JENKINS: If I could add a couple of things. One is in terms of accounting, accounting can handle different rate treatments by state, so 116 different states where we have different treatments that follow strict GAAP, some follow and others don't follow. Accounting and publicly-traded companies can handle it. That's my view on that.

What we really need to do is look at

the state, what makes -- what's in the public interest, what really addresses the customer benefit and make the decision, and that's what our Commissioners are allowed to do there.

In terms of some of the water sectors, a couple of things you raise. I just threw that out there. There's some energy efficiency law that was mentioned and access to that on the water side and the sewer side.

The other policy issue to think about is we have got in this state 1700 water and sewer companies and 67 percent have less than 3300 customers, and what that means is American Water, you know, we are engaged Smart, and looking at this Cloud-based technology you have an issue in terms of some of those communities being left behind some of this technology.

I think that's just things that we bring up to the Commission from time to time, and this Commission's been, you know, on the edge of some of these things with respect to trying to consolidate water and sewer systems and trying to

look at being able to use fair market value for the purchase price. I just throw that out.

There's a whole fragmentation out there and there's other customers in the state that with all this technology, at least in our sector, is very much fragmented in electric and gas companies that we wouldn't want to risk. Those systems don't have the technology deployed to lead to detection let alone in the accounting investment replacement infrastructure, so I just throw that out as another policy issue at the Commission.

DR. PETERSON: So I'm going to throw out a question that I'm not sure what I'm going to get from it, but the UK Reo process has been brought up several times in this panel and in previous panels, and that process is really an output-based regulation process as opposed to our traditional approaches input-based. We build our prices up on cost. We apply prudence reviews and we move forward.

If we were going to try to create an output-based mechanism that will allow for

incentives for these types of mechanisms, how would we measure those outputs and what would those outputs be?

Part of the problem I think that I see in this is that there are some real economies of scope in the sense that you could provide multiple services from the same types of technologies. And how do we measure that type of stuff? How do we know -- how does the Commission know we are putting this money in that and we are getting something out of it that is benefitting consumers?

(No response.)

I knew that was the response I was going to get.

(Laughter.)

MR. ABBO: Well, I'll comment on what we have seen there and then see how you might present something here. But the Reo model actually looks at those intangible things, things like reliability networks. They're actually looking at the number of connections that have industry generation capabilities. They're actually measuring the number

of micro-generations, or what they call Senior Selection Generation, actually generating electricity connected to the grid, both the individual level as well as the leading voltage grid. They're actually measure very tangible things, customer satisfaction, reliability of the network over time.

In our experience, more broadly in Europe, is that these performance-based systems, if you have kind of a target achieving 40 minutes of customer -- on average customer outage per customer and you are actually operating below that, there's a potential performance incentive associated with that.

If you are operating above that higher than 40 minutes, there's a penalty associated with that, and these are huge motivators for these power companies in Europe, and you can look at the past couple of months, actually the summer, that one of the European companies had a fine of 26 million Euros, because they had power outage for three days, and so these are performance-based systems and they

have very tangible elements that they're actually cheaper which really drives the behavior quite nicely.

MS. SATTER: I might suggest that the telecommunications industry have had a performance-based approach for many, many years, and that could provide some models.

Now in the telecommunications industry, it was generally acknowledged that it was cost that define the industry, so everybody knew that the digitization, if you will, of a network has reduced costs substantially.

So, as a result, we had a price cap system and then ratcheting it down to where it drove efficiency while recognizing that there were efficiencies to be had. I can't quantify that on the electric side. I don't know whether that system or that results can occur as a result of IT and outsourcing these various functions, but I do know that regardless you have got to maintain your poles, and your wires, and your substations, just like the telephone company had to maintain their equipment

and infrastructure.

So I'm just thinking that's one way to do it which drives efficiencies while recognizing that there are savings to be had. It's a model, now and, again, in Illinois we have formulary law and there are incentives in that law. There's expectations that because of the investment that was authorized, certain performance metrics would either be met or exceeded, and if they weren't, then there would be a penalty, so it was more of a stick than a carrot, because the expectation was that if we give you this money, this will be the result.

So we do have a form of an incentive. Whether you think it's efficient or not, I am not going to comment on, but, again, we have this rather unique law in Illinois where a lot of cases do and those kinds of incentives are working.

MR. OSTER: I won't pretend to be as experienced in this area more than I need to know, and I will cheat a little bit, and I happened to have New York Rev that I obtained and I just typed them out for something today.

(Laughter.)

I know this is the world we live in. So, you know, in Rev there's a point where the white paper is outlined, so I outlined not the whole list but four or five distinct categories that they have on their system.

The first one is production. The second one is energy efficiency of which 10 percent of key production has to come from energy efficiency, next improve customer engagement and information, so building a customer information platform, and then measuring how many of your customers are actually reaching through that platform. Next is affordability, what kind of programs are you creating to get at low-income customers and how many shutoffs are you avoiding in less than a year, and then, lastly, the connection, so the score, the input and the lifeline.

So that's how New York is handling it so far. That's just a discussion in progress. At least it's a starting point.

MR. NELSON: Just as the legislature imposes

performance metrics on utilities, it makes great sense to impose performance metrics on Cloud Computing Arrangement contracts, and although I think it would be one way to take away only, I would hope there's incentives both ways, but measuring, for example, analytical data, all kinds of metrics, depending upon what measure of the system, whether it's a resource system, or a billing system, or an operational system, things that we're measured on, like duration of outages and frequency of outages would be right up there, and things we like to measure and things that we like the customers -- again, things that we were held accountable for measuring with Cloud computing to providers. So we are all about metrics, and I think they should be used other times.

MR. ABBO: And just to respond for Cloud computing technology providers, we actually do measure through the software of the business metrics.

At Baltimore Gas and Electric, the energy reading meters that might be misreading, all

that is measured through the system, and then also the system uptimes also part of level agreements that we have in place, and so this whole accountability from the technology stack all the way to this processing. Obviously, it is not just us. It's also working with the utility operators to make sure that those actually occur.

DR. PETERSON: Well, we have got a few minutes left, and I think in those final minutes what I'll give everyone an opportunity to do is to directly talk to the Commission about what you think the role of the Commission should play, either in the short run, you know, perhaps in the next 6 to 12 months or maybe in the longer term period to help address these issues, and in particular issues that we talked about on Panel 4 here.

I know this issue of rulemaking has come up and if you can provide some details on exactly what you might want the Commission to do and how to move forward with that, and we'll take a few minutes and do that, and then we will turn it over for some questions.

MR. O'KEEFE: Sure. Thanks again. I'm thinking as I'm going through the day and I think that what's really exciting is that through the recognition of the value of Cloud-based software solutions, as well as in some ways the inevitability, but I still think there is some time for the Commission to consider truly whether it's a level playing field at this point and whether or not the utilities are encouraged to assess all solutions equally given the current infrastructure.

I need a lot of micro-questions to resolve around accounting, around how these parts are paid for, and why they are set the way they are with subscription fees, et cetera, and certainly look to companies like ours to help address those question, but ultimately we are just dealing with this analogy that I used all the data -- I think I found my opportunity -- which is that you wouldn't care when a utility's putting up a pole if they owned the forest or if they bought that pole from someone else, and that's fundamentally the simplicity of this discussion from our perspective.

Do they fully own that forest forgetting that timber firm or did someone cut it up for them and put it in there? And with the software and the service versus the long-term solution method, that's all we are dealing with, and if we are going to still be about pull up and they still carry those wires, and the same is true on this side of the policy-built technology.

So thanks for considering all of our perspectives today and I look forward to any questions.

MS. MEIER: The benefit of what someone previously said are taken care of, so I will keep it short. I think when we think about the basics, I think the number one thing I would ask the Commission to think about is I think everybody in this room agrees that this migration of Cloud software is inevitable, and it's coming, but I wouldn't count on that inevitability to be the driver for utilities and this industry to adopt Cloud software as quickly and as efficiently as other industries have and continue to do.

And so I think that today has been a wonderful start and I hope that this process continues through rulemaking, through further conferences. I think these kinds of conversations are going to be needed because honestly both sides of the chasm, if you will, are so unfamiliar with how the other side works. That's a big part of why I think it's taken a little bit longer, so these conversations are absolutely vital.

So I would just say don't count on that long term, maybe we will get there eventually, because I keep hearing on the panel eventually. No one's even going to make on-premise software. If we all agree that Cloud solutions are faster, they're more flexible, they're cheaper, let's get those out there.

MR. OSTER: I also want to echo the comments of my colleagues and also thank the Commission for having us here today. Obviously, this is important, and for the Commission to do this and it's exciting, and I'm really pleased to be part of this discussion.

I also want to echo what Mariko said. I don't want to imply that because on-premise software will no longer exist that we shouldn't be more in-tuned.

I'm thinking if I had to think of one or two things that the Commission should do and consider before I leave here today, the first would be to synchronize or assess standardization for security protocols of software, whether it's for statewide utilities or state utilities.

One of the challenges for companies like ours is that data security protocols that different utilities have in place. So if the state wants to encourage moving for a Cloud-based software learn about security protocols that are out there and setting the bar for utility goals. That will be easier for companies like ours.

I look at Amazon web server protocol. It's just it's incredibly long. There's certainly a lot of them out there, and so there are security protocols out there. They are very small. Setting standards, I think that would be very helpful.

There is the third thing I suggest I think, you know, and clearly we all recognize the gap between a number of things versus the Cloud-based software. Some of us will not invest in neither one, but I say just as important for the Commission to get different types of software systems and what's meter deployment, time and value, and costs are as a result of Cloud-based software system services on-site. In order for you to have your economists to be able to assess those decisions and make investments, you have to understand what the value and the economies are that could lead to on-based software.

Again, I'm not an expert on that, but there are things that you have to know in order to be able to take on that role, and I say that's an important step for the Commission to consider going forward. I will leave it at that. Again, I want to thank you again for your questions.

MR. ABBO: Really quickly, again, thanks again for having this forum. I think the problems of the smart grid is moving from hardware up to now

basically a software enabled system. That's what's going to lock the of value in the smart grid.

So I would encourage you to think about a multi-year plan of basically what are the benefits in the smart grid, and what are the costs, what are the software components, and basically put a plan in place that fits some of the best practices on a level playing basis in the system, understand the benefits to the consumer, understand the benefits of the operation of the utilities, and, you know, there's no longer simply putting in sensitive service wise -- well, Cloud-based processes that premises that for in-site and for the operational aside lower customer bills, et cetera.

There is a plan that needs to be in place multi-year to unlock those values and set $200, $300 per year to consumer and to the utilities. Thank you.

MR. NELSON: As I said earlier, the FASB updates are bright lines and hard tests, and so Cloud computing arrangements either all capital or at their own expense. Unfortunately, the test is such

that it's not going to be equitable, and so what we are proposing is that there is a middle ground here for up-front costs and fees to be capitalized.

In relation to that, we have an order of rulemaking, so we will see investing in workshops, followed by an order, rulemaking, and capitalize. The Commission probably should go further to say interaction as much as it deems that it wants to go in the direction of Cloud computing, and whether we are going to move in that direction or each time consider an IT change, we have to extend that along with all the other options, some directions to the utilities about how much of a push we make to the Cloud, so fix the accounting and ratemaking, give us some direction. We don't have far to go.

MR. JENKINS: I think Craig covered really what in one word the history as we went through this, as I sat through the day. I mean, this Cloud computing is absolute, and I know that it's the wave of the future. I think these issues are going to continue to get bigger and bigger. That's the reason

integration costs are more and more important; otherwise, you can, in an informal ratemaking or in rate cases like in the water sector, put a handle on performing costs in a test year.

So that needs to be handled and addressed by this Commission for years, and that's just the right balance in terms of energy generation, equity and clarity in this period will get the help, because the new accounting rules add a level of confusion that is just going to get stalled in terms of just getting things deployed as quickly as we might.

But other than that, I just really want to appreciate the Commission bringing these issues before us, and I think it's important and I will continue to talk about the benefits of Cloud computing for years to come.

MS. SATTER: Thank you. I just a few comments. First of all, I appreciate that the vendors of Cloud computing think it's a great service, that it's the future and that they want to expand into the utility space, and I think that's fine. That's reasonable

and that makes sense, but as utility regulators, that is regulators that offer an essential service everybody needs, whether they're on a $600 monthly fixed income or a $600,000 annual income, these services have to be available to everybody.

As a result, Illinois law requires that service and costs be the least cost, so I would suggest that in looking at these services are they least cost? Is capitalizing across least cost compared to expensing, especially when you look at all the other expenses that utilities have to address, all the other capital expenses in particular.

Ordinarily, the Commission, the regulatory body, does not direct particular expenses. Let me step back a little bit.

The utility manages its own business. The regulators -- consumer advocates we don't micro-manage the utilities. We say you know your business. You know what you have to do but be guided by the least cost principle.

So we would hope that when you review

these, just as you utilities are guided by the least cost principles, you are guided by the least cost principles.

And I say to the vendors the same thing. We understand that this is a forward-looking, very valuable service and that it really has great potential, so what I would say to you is go out and develop product services, create services that will meet our needs that are least cost and sell them, sell them to our utilities, make it better, and really I feel like at this point it's kind of up to the vendors to come up with really good products, least cost products, that the utilities cannot say no to and their regulators will not only not say no to but say thank you. So I think that that is kind of the next step.

This has been an eye-opening experience. I appreciate seeing this part of the business, this part of the world. On the other hand, it's not completely new, particularly in the energy efficiency space and demand response space. We know that's been going on, but it's out-sourcing

other functions, such as billing, such as HR, human resources, such as other operational functioning should those be out-sourced? On what terms?

These are very complicated questions, so please package something. That's what vendors do, and so I think that that would be how I would see next steps.

DR. PETERSON: Thank you, Sue.

We have time for maybe one question. Commissioners. I always wanted to say this hearing then --

CHAIRMAN SHEAHAN: I think everyone is out of gas. I would like to thank all of you again for taking the time in joining us today. We have been very fortunate to hear from experts in the field and I think it's safe to say we have all learned a great deal.

I would like to offer special thanks to Anastasia and Elizabeth for their assistance in organizing today's forum and to Paul Reiser for his technical support.

The issues that have been raised today

are only going to become more prevalent as the technology advances. I can't overstate the importance of continuing to have events like this to educate each other and be a catalyst for change in this industry. Everyone here is interested in the impact of cloud-base technologies, and I ask that as we leave today, let's continue to think about the next steps in making these ideas a reality and how we can be technology enabled.

I can't thank all of you enough for joining us. I know many of you have come from great distances. Thank you again for being here participating. Thank you.

(Applause.)