BEFORE THE

ILLINOIS COMMERCE COMMISSION

POLICY SESSION

NEXUS BETWEEN ELECTRIC VEHICLES and
GRID STABILIZATION

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Met, pursuant to notice, at 9:00 A.M.,
at 160 North LaSalle Street, Chicago, Illinois.

PRESENT:

BRIEN J. SHEAHAN, Chairman

SADZI M. OLIVA, Commissioner

D. ETHAN KIMBREL, Acting Commissioner

ANASTASIA PALIVOS, Acting Commissioner

JOHN R. ROSALES, Commissioner

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ACTING COMMISSIONER PALIVOS: Good morning, everyone. Welcome to the Illinois Commerce Commission Policy Session on the Nexus between Electric Vehicles and Grid Stabilization. This session is convened pursuant to the Illinois Open Meetings Act. Our guests and panelists should be aware that a court reporter is present. A transcript of this session will be posted to the Commission’s website.

With me today are Commissioners Rosales, and Oliva, and Acting Commissioner Kimbrel. Chairman Sheahan will be joining us this afternoon. We have a quorum.

I would like to take a moment to thank our panelists for their participation and all of you for taking time out of your busy schedules to be here today. I'd also especially thank my Legal & Policy Advisor Emily Brummit, and Katharine McErlean, and Meagan Pagels, also at the ICC, for their help in organizing this very timely session.

(Applause.)

ACTING COMMISSIONER PALIVOS: According to a
recent analysis from Bloomberg New Energy Finance, EVs could account for half of all new cars sold by 2040. And, to date, Illinois ranks sixth in the nation with the number of deployed EVs. Because widespread EV adoption in Illinois could bring the state up to $43 billion dollars in cumulative benefits by 2015 -- including reduced utility bills, carbon pollution, and fuel expenses -- the time is right for the Commission to engage in a strategic conversation on how EVs can add value to Illinois' economy and electric grid.

EVs are no longer the car of the future. They are our present. In most situations EVs have become a reasonable and acceptable alternative to traditional fossil-fueled vehicles. The release of Tesla's latest Roadster with a 620-mile range illustrates that EVs could soon be superior to gasoline-powered vehicles in almost all respects.

At the same time, there are significant barriers that EVs must overcome before becoming the household norm, such as insufficient
charging stations, battery storage capacity, and electric grid load issues. One of the biggest challenges in the modern energy industry is optimizing our electric grid to widely and reliably distribute renewable energy. Not only are we interested in policies that may encourage EV deployment, but we're also curious about how EVs may impact the grid if they are able to overcome obstacles to adoption.

This leads us to address some very important questions. For instance, how could widespread EV deployment complement other forms of renewable energy such as solar and wind? How might different rate designs impact the grid?

While the increased adoption of EVs has the potential to help states meet their renewable portfolio standards by reducing reliance on fossil fuels, how else will EVs impact the way customers interact with and release energy? What behavioral changes might consumers need to make to realize the benefits of transportation electrification?

We are here today to discuss these
very questions and to hear from our expert panelists about the research and visions as it concerns EVs and grid electrification. We will hear about EV technology deployment, market landscape, and consumer preferences, potential EV impact on the electric grid, and ways to optimize EV charging for grid support.

At the end of each panel we'll have about 20 to 30 minutes for discussion among the panelists and audience; and we encourage our attendees to ask questions and share your observations.

Commission Policy Sessions are designed to create respectful and necessary dialogue around topics of interest not only to the Agency but its many stakeholders. So please keep this in mind as we move through today's presentation.

Thank you again for being with us today -- I know it's very early -- and for your interest in this topic. Without further ado, I would like to introduce our first moderator, Emily Brummit, who will introduce our first panel.
Emily?

MS. EMILY BRUMMIT: Thank you, Commissioner Palivos.

As the Commissioner said, my name is Emily Brummit, and I'm the moderator for Panel 1. The purpose of this panel is to discuss the impacts and benefits of electric vehicles on grid stabilization and to consider how electric vehicles help the grid become more efficient and less expensive. The format of the panel will consist of brief presentations by each of our panelists followed by a series of questions. If time remains at the end, we'll take questions from the audience.

Before I begin I would like to introduce our first panelists. First we will hear from Dan Bowermaster, Program Manager of Electric Transportation of Electric Power Research Institute. Next we will hear from Mike Waters, the Director of Utility Solutions of Charge Point.

Following Mike, we'll hear from Katie Bell, Energy Policy and Business Development at Tesla. Last, but certainly not least, we will hear
from Kate Tomford, Senior Analyst at the Chicago Transit Authority. Please join me in welcoming our panelists.

(Applause.)

MR. EMILY BRUMMITT: Dan, you are free to begin when you're ready.

MR. DAN BOWERMASTER: Good morning, everyone.

Thank you very much for having me. So I'm Dan Bowermaster from EPRI. And for those of you who aren't familiar with EPRI, this is how I explained it to my family over Thanksgiving:

We're a non-profit scientific research institute; and we research, on the grid, everything from electricity generation to how it's used. Our group focuses on electric transportation, big and small. The light-duty stuff, like, the Teslas and the Nissan Leafs, there will be a lot of them; but I think it's important to remember that there's everything from buses to forklifts, and it all kind of falls in the big bucket of electric transportation.

So what I'm going to talk about today
is, How many EVs are here? And there are at least 810,000. Those are the numbers from March; and they're still trickling in today. What's coming? By 2023 (sic) there will be almost a hundred plug-in electric vehicles at your customers' dealers to pick from.

Can the grid handle it? That gets a lot of attention. The short answer is yes. The reason why is the utilities have been working on this for almost three decades now, which might come as a surprise to some of you. And then, How can we get better?; and then identifying ways to do that.

These slides will be publically available to all. I might skip through a couple of them in the interest of time and then allow for discussion, but they will be available.

So there were 787,000 EVs on the road by the end of February, the end of March; and those numbers are still trickling in. Yesterday the interim number was 23,000. So doing my scientific EV math, that's 810,000 on the road. It's kind of split halfway between the fully electrics and the plug-in
hybrids. Again, it doesn't really matter so much, at that end. We all drive what we drive; and the important thing is for customers to pick the EV that's right for them.

Another headline that you might have seen is that EV sales were flat; and that was true back in kind of the 2014 time frame. But since, you know, kind of the end of 2015 the quarter on quarter growth has had a pretty substantial gain every quarter, at least 20 to 35 percent. And, you know, we started with small numbers, so I don't even get bent out of shape about the numbers. I think that it's all just a trend.

So here's the trend: So I love showing this chart because it's always wrong; and that's because the car companies, it seems like nearly every week, are announcing a different plug-in electric vehicle. And what this data here shows are individual car announcements. It does not include the -- you might have seen headlines that these dealerships said, "We're going to have 25 electric cars by 2025." This data does not include that.
This data is the individual vehicles that the car companies have announced.

What is also important is that pink category (demonstrating). And I'm sure no one who's sitting farther than 10-feet back from the slide can see it. But that pink category is SUVs and cross-overs. So, roughly, a third of them, by 2022, will process 21 electric SUVs and cross-overs; and that's what these customers, not only in the U.S., but globally are buying. Now, the question is, What kind of plug-in vehicle do I want? Do I want a sedan? Do I want a hatchback? Do I want a cross-over? And it's also important for you to remember when we talk about this, from the automotive perspective, it's all about scale. It's a global industry.

The other thing to keep in mind -- and this is a subset of what we just saw -- and this is for the fully electric -- is that the driving range is increasing. So battery driving prices are dropping. I'm sure most of you have seen this headline. (Inaudible.) So you're seeing longer and
longer ranges for the same costs and decreased battery size. And, again, that's a good thing. So when I see, in 2011 and 2012, you would pick from 80 to 90-mile range cars, now we're picking from 200-plus range cars.

Again, kind of the mass market cross-overs, they're coming. I want to draw your attention to this briefly. The New York Auto Show was last week. And on the right you see three SUVs and cross-overs. The top one, the blueish one, is a Lincoln. And there's a little Kia, the gray one. And then the red one. This is not to highlight a specific car. The point is that, you know, again, these bigger vehicles that plug in are coming. Ford, who owns Lincoln, surprised everyone because they told Wall Street, "We have this kind of electrification strategy. We're going to have some longer range -- 300-range cars, and we're going to have some regular hybrid plug-ins" all of a sudden. Everyone was surprised that they pulled out, basically, a Ford Explorer, a 3-Level kind of cross-over, or large SUV. But there's been no
announced body-on-frame, big, kind of Ford Expedition
or Chevy Tahoe, sort of large SUV and there's been no
body-on-frame plug-in hybrid pick-up truck that's
been sent out yet.

Again, it's also important to remember
that since battery prices are dropping, these big
vehicles are here and coming; so what used to be
maybe perhaps a challenge, the price of batteries are
dropping (inaudible) --

THE REPORTER: Would you mind slowing down,
please?

MR. DAN BOWERMASTER: Slow down? Okay. I
shouldn't have had that cup of coffee this morning.

(Laughter.)

MR. DAN BOWERMASTER: Higher power charging is
coming. We've all seen those headlines. If you're
not familiar with EV charging, you can charge it just
like you charge your smart phone. You plug it into a
wall with 120 volts; the car sits for 21-plus hours a
day at home, and work, and church; that would be
quite a bit of time to re-charge the car. You can
charge the car like your smart phone; you can charge
it while you sleep; you can charge it while you have
dinner; and the car, for the most part, is the same
thing.

Now, as for the DC charger, it is a
little different if you're running errands on a
Saturday. If you're driving to grandma's house or
something like that, or if you're driving across the
country, it's a little different if you're using kind
of the high-powered DC charger. As you can see, the
rates are increasing right now for the DC and other
groups. They're moving up to the 350 kilowatts.
Again, this is for light-duty cars. For the bigger
vehicles, like, buses and things like that, it's
already there.

And this number might surprise some of
you. But, you know, we work closely with the vehicle
manufacturers, big and small; and some of the big
trucks, folks are asking for a connection of up to a
megawatt per vehicle; so that's a lot of power. And
the utilities can provide that. It's not a question
of can they or not; it's, How do you value a car of
that scale?
So next is Charging Infrastructure. And we'll hear more from the other panelists on this. But utilities right now have up to $2.5 billion dollars of EV programs -- infrastructure programs. And I just want to say that that's just part of the puzzle. It takes a village. So it's private capital; it's taxpayers' money; it's public money; and we need more than just this.

You know, there's various data on this. It's not just charging infrastructure. Every stakeholder has a role, whether it's a nonprofit, or a car company, or a utility, or our government. And, as you can see, for a lot of these -- and, you know, I apologize that this slide is actually cramming too much information on it -- but there's a lot going on all the way across the industry.

So let's go to Grid Reliability. So there's plenty of generation, excess generation. What about grid impact? We've done studies; and the utilities have been working, again, for a couple of decades now. And the short answer is that, due to the diversity of charging, we're seeing lower grid
impact. The charging power level has more to do with how much it cost than the time of day. Although, the time of day is also important. And this slide I realize is boring, but it shows the facts. So that bottom chart shows the results.

The California utilities have to report every quarter on how much they've spent on and what they've had to do to support EVs. And here's the number. You can kind of see that this data is from last year. There was about 280,000 EVs at that time; and they only had to upgrade .16 percent on all service lines. Now, I dug into that number and called up friends out there. And I said, "Well, what does that mean? How many transformers do we have to upgrade?"

So look at SCE. What is that number? 16? I can't read it from here. You know, that SCE number -- they had six transformers. They had to upgrade thousands of EV customers. So you might be asking yourself, "Well, what's the 'why'?" And the reason is -- and, again, the utilities have been looking into this stuff for more than two decades --
it's an innovative sort of planning. You know, a home charging station is kind of like an air-conditioner; so, on the one hand, we've done it before. But the point is that the utilities have been looking at this stuff, and they're working hard with the different collaborators in the industry to kind of figure out how to best support this going forward.

I think I'll just kind of leave it there for now and leave time for any questions. Thank you.

MS. EMILY BRUMMIT: Thank you very much, Dan.

COMMISSIONER ROSALES: Can I ask a question, please?

MS. EMILY BRUMMIT: Absolutely.

COMMISSIONER ROSALES: Thank you, Commissioner Palivos, for pulling this together. Being able to have this much time on this specific issue is important to all of us at the Commission. So, again, Commissioner Palivos, thank you so much.

I'm going to push back on you on the electricity -- on this "It's kind of the same as a
smart phone". So you're telling me that if I have an
extension cord, I can plug it into that one right
there, a regular cord? That's all we need? Even for
an air-conditioner there needs to be a separate line
for power. This one is going to be the same 120
volts as a cell phone? That's what you're telling
me?

MR. DAN BOWERMASTER: Yeah.

COMMISSIONER ROSALES: Okay.

MR. DAN BOWERMASTER: I mean, you should -- the
wall outlet -- you want to make sure that your
customer has a wall outlet that's in good shape and
relatively new. And the car won't charge if that
outlet is not grounded; so there's still
infrastructure issues there. But it can start as
easily as using a wall outlet. We did it in our
family, yeah.

COMMISSIONER ROSALES: Okay. Thank you.

MS. EMILY BRUMMIT: Thank you so much for your
question, Commissioner Rosales.

Let's go ahead and move on. Mike?

MR. MIKE WATERS: Thank you. Good morning,
everyone. I'm Mike Waters, Director of Utility
Solutions for Charge Point. Thank you to Acting
Commissioner Palivos for the invitation and the rest
of the ICC. I appreciate the opportunity to speak
today. And I understand that this is part of a
larger effort, in terms of the technology that
generates things. I'm pretty sure that you'll find
that this is the most exciting one. I think you will
see it -- in terms of the excitement that you get
from talking about electric vehicles.

My intent today is to talk a little
bit about the charging industry's perspective.
Obviously, you've got the affiliates; you have
lawmakers; and you have the charging solution
providers. And all of them are necessary to really
provide an ecosystem. So I'll talk a little bit
about how we see the charging world, how it might be
impacting the grid, but also digging a little bit
more into the market itself; and, you know, where we
are seeing charging stations that are out there
today; who's doing it, and how does it impact the
driver.
Just a quick background on ourselves. If you don't drive an EV, you may not have heard of us. There are hundreds of thousands of drivers out there today who are using one of our stations. We are the largest EV charging provider out there in North America today with around 47,000 ports. Everything that we do is smart and connected charging infrastructures. With various exceptions, most of all of our stations are actually independently owned and operated by third-parties, whether they be employers, retailers, you name it. Those are the folks that are installing the stations; operating them; and we provide them the products and services necessary to optimize the usage of those stations.

I don't want to spend too much time on this because I think Dan covered it well. But just specific to Illinois, I'll just note that, in terms of EV adoption, I believe we're around 15,600 vehicles on the road today, as of at least the end of 2017. And that's about 8th in the country, in terms of states. So those are pretty good numbers. It's growing at a really good rate, 34 percent year to
year, if you look at 2016 to 2017. But, again, we're really seeing everyday advances from auto makers: new models available, lower prices, increased battery range. And all of those together are really helping to drive this market forward.

Now, from our perspective what really matters is not just the numbers, but who are these people and what drives them, what are their issues? And so there's a lot of different reasons people go electric. They sometimes like to save money. Maybe it's the environment. Maybe they just like the technology; but it's really understanding those needs that helps drive us and provides solutions for the EV drivers.

So just a quick snapshot of the EV charging market itself. It is a healthy competitive market. There's a lot of change. There's a lot of innovation going on right now. In terms of trying to get a handle on how many charging stations are out there, it's always difficult trying to get power sources, to navigate and get the data together; and the latest report shows about over 150,000 EV
charging stations sold last year, putting the total number sold to around half a million charging stations. And the graph at the bottom is a snapshot that gives you an idea of how that has changed over the years, in terms of the numbers of stations out there in North America. You can really see how things have really grown here over the last 8 or so years.

The other thing that I would just point out is that when we talk about the EV charging market, there's really two components. As I mentioned earlier, we do networking -- the networking side. We also are involved in the hardware side. There are some who just provide hardware. So there are charging stations, and then there's the actual network to help bring it all together and connect the drivers to the station.

So let me just give a little perspective of the drivers themselves and what they do on an average day. Most people are going to be just fine charging at home. 80 percent of charging actually occurs at home at the convenience of the
driver. They can go home. Usually the car is there for 12 hours. They can plug in and charge overnight and be fully charged when they leave. For most people, again, half is in the garage; they charge the vehicle at home. I assume if you're downtown in the big city, that's a different story. But outside of the home it's also important to have access to charging infrastructure; and that can be at work; it could be at destinations, public locations, you name it; and that's really to help ensure that you optimize electric mile efficiency.

So if you have a plug-in hybrid model vehicle, you might only have a 20 or 40-mile range. Maybe you would have spent -- you would have used all of that by the time you get to work. It would be great for you to recharge at work and come back home on the electricity that you have. But if you have a pure electric car, all of these charging stations out there provide you the range confidence for where you need to go on any given day.

The other point that I would make here is that drivers need convenience and conductivity.
Much like today, people expect that from -- they have smart speakers; they have smart thermostats; and they'd like the ability to have the control, convenience, and conductivity with all of these devices; and their vehicle and also their charging solutions is really part of that. So I kind of almost view it as part of the consumer electronic ecosystem.

So let's talk about the charging station outside of the home. Where are these and who are putting these in? So it's important to think about the paradigm shift. We're no longer talking about gas stations necessarily like in the way that there's one on every corner and you fuel once a week. You're fueling at home most of the time; but outside of the home what you're really doing is charging while parking. So it's more of an, "Okay, I'm going to work, and I'm charging along at work," or "I'm doing it at the grocery store, and I'm charging along at the grocery store". So those types of entities, we call them site hosts because they're the ones who are putting charging stations in. And they do it for
a variety of reasons. Yes, they can recover some revenue from the drivers, but often that's not the main goal. It's not a profit center. Right? They're not going to make enough money from the drivers to cover all of those costs. So what we see is a combination of that as well as other value streams. Right? You have employers doing it. There's a range of benefits; you want to track and retain employees. You have the City doing it because it's a sustainability goal. You might have a retailer do it to attract customers to come into the store. There's a lot of different reasons.

What I've put together, that's where we're seeing more and more of these entities putting in charging station out there today. So today these individual sites are choosing whatever stations and networks that work for them, and they're also using the network stations to really help optimize that. Right? They might set pricing to a -- the retailer might say that it's free for now, but then they put a price on there to get them off of the station once they're done shopping. Once somebody's at a station
for 8 hours and taking up that station, then you're done charging. So those are just a couple of features that people are using in the network to help ensure that you are optimizing utilization of the station.

EVs are definitely a beneficial load for the grid. Dan and I go back at least a decade, in looking at the utility perspective. It's really a great opportunity. If you look at the revenue that can even come in from the utility perspective, they're going to have rate talks to serve folks. So what does mean? It means that all customers of the utilities can actually benefit, whether or not they have EVs. And it's important to note that it has to be done right, the program. The more you can encourage charging at the off-peak, the greater that value is to all customers of the utilities.

And beyond that, there's additional benefits. Right? Beyond the grid you have the environmental benefits, the energy security. We talked about some of those in the very beginning, in terms of outside of the grid benefits themselves. So
it's really a win-win-win all the way around, in terms of electrification and transportation.

Utility engagement is critical. You know, we believe that they really do need to be engaged. It's important. We have to encourage that, and we work with utilities across the country to help think about program design and how to incorporate this load in a beneficial way. We typically see three different ways -- or at least approaches. We kind of started with the analytical approach. What does this load look like? And that's where network stations, again, can really help provide that.

Then looking at how do we encourage the right type of load; and maybe it's the off-peak. That's where that second figure comes into play, using pricing signals or DR programs you can encourage charging in the off-peak as opposed to when it normally occurs, which is late in the afternoon. And the third is more around charging infrastructure and looking at incentives and, potentially, investments in charging infrastructure.

And there's a bunch of different
models here. Just to highlight a couple, you can have rebates to help minimize charging infrastructure. You can do make-ready for the distribution systems up to the charging station. You can even have models where the utility might have a turnkey included at a charging station. So all of these different models can help encourage deployment of charging infrastructures in a smart way. We work with the utilities to figure ways to ensure that. Again, we're always thinking about the driver at the end of the day. How does this impact, by the end of the day, what they can do? How do we ensure that a competitive marketplace is still able to be encouraged? And all of that is possible. It's just work. Right? We work with the utilities across the country to make sure that these programs can align both with the existing markets, but also can certainly be a benefit for electric vehicles.

And then, finally, just one last slide that kind of summarizes some of the key best practices that we've learned. Really the important thing is these forums to have the discussion and
dialogue. And then moving forward, also looking at, potentially, how do achieve regulatory certainty and clarity for all parties. Right? The utilities need to be able to understand what's the recovery option. Right? Is there a rebate and a regulatory asset model? If it's the site host, how are their choices going to be impacted moving forward with the utility programs? If you're in the industry, how is our market going to be affected moving forward with the utility programs? How do we continue on our quest of innovation and make sure that we optimize value to the drivers and site hosts? And there's, again, a lot of new ways that we can do that in discussion. You know, these are for open discussion anytime, if you want to get into that. And then at the bottom there are a few examples of utility programs out there today that have been approved interactive.

So then that would be closing. I'll take questions now or later, if you'd like to. If not, we can go on to the next speaker. Thank you.

MS. EMILY BRUMMIT: Thank you, Mike.

COMMISSIONER ROSALES: I understand that for
someone that's selling a charging station you can say that it's good for everybody even if you don't have an EV, but it makes it really hard for us at the Commission for residents to come up and say, "I'm being charged for this, and I don't even have an EV. Tell me why I'm charged this fee and I don't even have an electrical vehicle."

Other than the environmental aspects of it, which I understand, how is it that you can say that?

MR. MIKE WATERS: So a lot of the studies I've looked -- if you really look at the numbers, and when we have seen studies, whether it by A3 (phonetic) or other groups, what they look at is all of the revenue that has come in from incremental loads by discouraging -- the more so we can put it off-peak the better, because that would reduce the cost to serve that load. And, in comparing those two, almost in all cases that I have seen the net benefit -- there's going to be an incremental benefit to all ratepayers. So the trick is to what degree does it incrementally increase the beneficial load? And it
doesn't -- the premise doesn't have to be put into that model, but it's really a good exercise to go through to determine exactly what that benefit is. We would also encourage that it be balanced, right, for the cost of the ratepayers. So we're looking at these models to kind of minimize the risk on ratepayers. It's also important, right, to have cautionary buying for site hosts, et cetera. Right? It doesn't necessarily mean that we have to recover all of those costs if you're getting charged. If they're more than willing to put money in, you know let's spread that risk and make sure that it's not all of our ratepayers.

MS. EMILY BRUMMIT: Thanks so much for your question, Commissioner Rosales.

COMMISSIONER ROSALES: I'm still not convinced, but let's move on.

MS. EMILY BRUMMIT: All right. Thanks so much, Mike.

Katie, you can begin when you're ready.

MS. KATIE BELL: I'm Katie Bell. I work at
Tesla, and I work on Energy Policy and Business Development. So a little background on Tesla. Let me just remind folks of what our mission is. Our mission is to accelerate the world's transition to sustainable energy; so we've developed a product ecosystem that supports that and where we develop solar to help develop renewable generation. We then developed storage, which one can be able to utilize their energy solar at times when they need it; and then when they have excess solar, they can store it for a later time. We also have our charging networks. And what we're most known for is the electric vehicle. And so today, given the subject matter of this workshop, I will also be focusing specifically on the EVs.

So I think what Tesla can offer is the consumer perspective of investing in electric vehicles. And over the years, as we've been selling EV vehicles, there have been three major questions that customers will have when purchasing EVs. And these are obstacles that we all have to overcome in order for one to want to make that conversion from
their vehicle to an electric vehicle. And those three questions are: How much does it cost? How far does it go? And where can I charge? And so the first two questions are on the auto manufacturers to figure out, as we're in control of how much it costs as well as how far it can go. But the third question of where EVs can charge is going to require a stakeholder process. So it's going to take a lot of stakeholders as well as global solutions and progress in order to make sure that we can achieve our objectives.

It's also our firm belief that you need access to charging in order to sell EVs; so Tesla has gone ahead and built a charging network out of necessity. It got me thinking. I was curious to know, looking at Illinois, what have they done or what have we done thus far in order to look at where EVs are today and where they're going? And when looking at it, I noticed that there was a lot of information out there. I noticed that there was a plug-in electric vehicle study done, or initiated, in 2010. There was an Electric Vehicle Act in 2011.
There is an EV Advisory Council that submitted a final report on EVs in 2011. And then the ICC had also released a PEV Report and Recommendations by March of 2012. And to go through this process there were also EV infrastructure grants and EV incentives of up to $4,000. And from what I can tell, the programs stopped around 2014, but it's possible that that could be a different number. And then, most recently, there's Next Grid. And so, you know, I think there's been a lot of work done thus far and a lot of lessons that can be leveraged today from this information.

And we've built a concrete program. And the difference between today and what maybe has been studied, roughly, 8 years ago is that technology and costs have gone done substantially. And so it's pretty interesting when -- I think the takeaway is that there were projections that by 2015 there would be a hundred thousand plug-in electric vehicles in Illinois. And so the fact that we're not totally there -- I believe Mike referenced that there are, roughly, 15,000 vehicles as of the end of this past
year. You know, that projection may not necessarily be aligned -- we're still kind of in that place where we're looking to advance EV adoption because, as it can release the amount of benefits that I've studied thus far -- I believe M.J. Bradley & Associates went ahead and did an Illinois-specific report and determined that there are billions of dollars of benefits that can be realized by 2015. And so to get to those billions of dollars of benefits you really do have to have the EVs on the road to make that happen. And so when we talk about grid stabilization and making sure that the grid can accommodate these EVs, I think the study that was produced in 2012 -- I think part of the consensus was that the distribution companies felt comfortable with their distribution plan, in that they can accommodate the extra load that EVs will have from charging.

And so those are the plans that -- that planning process is sufficient for today until more EVs come on the road. And so, you know, there are different mechanisms, based on the amount of EVs that can be leveraged, in order to get to that end
state of realizing those billions of dollars of benefits. And so right now with so little EVs, you know, there's a lot of head room that you can play with to kind of figure out what programs can be optimized or what mechanisms or strategies can be used to get to these ideal places where the grid is constantly being utilized as efficiently as possible, as those issues will come more so when you do have hundreds of thousands of EVs on the road.

And so to kind of conclude this thought, we need -- again, to get more EVs out there, you need the ingredients to make the cake of EV benefits. And so I think the program that at least we are looking at today, in ensuring sufficient utilization, may be different than what we might look for at a later date. And I'm happy to discuss that further.

MS. EMILY BRUMMIT: Thank so much, Katie.

COMMISSIONER ROSALES: Question.

MS. EMILY BRUMMIT: Yes. Go ahead, Commissioner Rosales.

COMMISSIONER ROSALES: So what is the number to
receive the billions of dollars in benefits?

MS. KATIE BELL: I believe the study from M.J. & Bradley that I looked at was roughly 3 million vehicles to get to the $52 billion dollar investment -- or $52 billion dollar net benefits.

COMMISSIONER ROSALES: And we have 15,000 vehicles?

MS. KATIE BELL: Right.

COMMISSIONER ROSALES: We've got a long way to go.

MS. KATIE BELL: Yes. And to kind of get to your question about concerns about the cost of charging and a line item on a customer's bill for their cost of an EV, I mean, I don't think we're there yet. Customers aren't seeing incremental costs from EVs at this point in time. So I think the whole -- the future discussion has to be about figuring out maximizing downward pressure on costs, as Mike was alluding to, to ensure that that never becomes a line item.

COMMISSIONER ROSALES: I agree with you on the stakeholder process. That's why you're here. That's
why we're all here together; but at some point
there's going to be a question of resources and which
way do you go. And I'm looking forward to what Kate
has to say on the City of Chicago.

You raise the CTA a quarter, and the
place just goes nuts because that's the way it is
living in the city. The infrastructure that you need
for public transportation is pretty massive. We had
Metra here last week explaining why their rates go up
every year, because they're not getting the funding
that they received from the Feds as they did in the
past.

So when we talk about the stakeholder
process, which I agree with, you know, it's hard --
it's kind of hard for us to say, "We really need to
do this", when we have others saying, "Look, we just
want to get to work, and we really don't have the
resources and the opportunities." When you said
there's 80 percent of those that charge at home, if
you live in the city, a lot of these folks don't have
those homes. They don't have the kind of homes with
infrastructure like garages or whatever. They live
in apartments, and they're just not there. So do we put them on the street? And if we put them on the street, where is that money coming from? So I just want to throw that up, because we have grappled with that all of time; and I'm looking forward to Kate to see what she has to say. Thank you.

MS. EMILY BRUMMIT: Thanks, Commissioner Rosales.

Kate, go ahead and get started when you're ready.

MS. KATE TOMFORD: Thank you so much. It's a pleasure to be here. I appreciate the invitation. My name is Kate Tomford. I am with the Chicago Transit Authority. I work in the Finance Department, and I work on everything related to energy. I'm going to focus on our Electric Bus Program today, but I want provide a little bit of context about CTA.

First of all, we run over 230,000 miles of electric vehicles already today; and that's because of our entire rail system project. We have over 1400 railcars that are all electric already, two electric buses that are operating currently. But I
just wanted to stress that we have an entire infrastructure built across city that already supports electric vehicles and has been thriving for a number of years. We do operate throughout the city and touch 35 suburbs, and we provide over 1-and-a-half million rides a year. So most of the public transit on EVs; 81 percent of public transit in the Chicago area are on CTA vehicles.

In terms of the electricity spend and the fuel spend that we have on an annual basis, that totals about $68 million dollars. It's about equally split between the electricity that we pay for on the rail side and the fuel that we pay for on the bus side; it's diesel for the buses. We have a little wedge, then, of facility energy to split between electricity and natural gas. But my scope is this entire $68 million dollars, figuring out how we can reduce it, figuring out efficiencies that we can achieve and also understanding our pricing while paying for all of these commodities.

As I mentioned, we have two electric buses in our fleet today. They've been in the fleet
for about 3-and-a-half years. They went into service in October of 2014, and they've been performing very well every since. They've been in all sorts of road conditions and in Chicago weather conditions and have not had a problem, in terms of charging or operating. The two buses are made by New Flyer. As you can see in the photo, they have six different battery packs, some on the undercarriage, some on the roof of the bus. They look pretty much like a normal CTA bus, except you'd probably recognize them from the special rack that they have; otherwise, when you get on the bus, it looks like a standard CTA bus with the alignment of the driver and the seating going back in two rows.

They currently slow charge in two of our bus garages. They slow charge on a hundred kilowatt charger. As Dan was saying, there are a range of different charging power levels; and these, for heavy-duty vehicles, are considered slow chargers. The battery packs give us a hundred-mile range, but we typically operate at 80 miles max just to have a cushion for reliability.
I apologize. It's a little hard to read, but I'll explain the operating cycle that we go through on a daily basis with these two buses. They charge overnight in the garages. Then they go out and they provide the morning rush service. They run up to about 60 miles during that morning rush. They come back to the garage during midday. From about 11:00 till 3:00 o'clock they're charging again. They do a 4-hour charge on the slow chargers. And then they go out and they provide the PM rush service. And that pretty much maxes out the 80-mile range that we use. After that they come back to the garage and they charge again overnight, and the cycle keeps on, on a daily basis. So we do need to charge them during the day, when the grid is most likely at its peak, to get the maximum mileage that we can out of them.

We run buses for up to 300 miles in what we call a service block. So a diesel bus will go out and run 300 miles of service before coming back to the garage to fuel up. On the electric side, that would be our ideal, but we don't have the range
right now on these buses. The map on the right side is just showing you the various routes that we run these buses on. We try to take a variety of routes over time just to check them and check their performance in different conditions.

We're currently in the middle of procurement for our expanded fleet of electric buses. We have committed to purchasing 20 to 30 buses in the next couple of years. We have federal grant funding, about $42 million dollars at this point, that we've been awarded through various grant funds from the FTA and the EPA to purchase both Chicago buses and the charging infrastructure for them. The proposed deadline was March 21st, which was a couple of weeks ago. We are now going through the process of reviewing those proposals. The base order in the RFP was for 20 electric buses, and then we have options there for up to 25 more. We also are buying five fast-chargers, two for each end of the route that we're planning to electrify and one for a garage. We think the contract will be executed around the summer of this year; and then we're hoping to get the first
five pilot buses delivered 6 months after, and then just proceed.

We always test our new buses for a minimum of 8 months to get all weather conditions into the testing cycle; and then we'll be placing the order for the remaining buses. And by 2020 you should see all of these buses in this order out in service.

In contrast to the two New Flyer all-electrics that we have in our fleet now, the next batch that is in procurement will be charging on route. So that means rather than returning to the garage and charging overnight, or for a long stretch in the middle of the day, they'll be charging during the layover time that's built into their route schedule at the end point of the route. The route that we've chosen to electrify is Route 66. It's the Chicago Avenue bus, and it runs about 10 miles. The eastern terminal is at Navy Pier; and that's the aerial photo on the left there. The western terminal is at the intersection of Chicago & Austin.

I included some photos from other
deployments around the country and around the world. It's a map that cantilevers over the roadway, and then the charging device is at the tip of the map there. And you can see that there's an arm that comes down from the charger and contacts the route of the bus and charges the battery; so in about 10 minutes the bus will get a good charge and will be able to continue on its route. The buses will enable passengers to board and alight during that time. So it's built into the schedule.

These chargers are fast chargers, as I mentioned. We are expecting, in the RFP, the highest power charger that's on the market today; and we expect to get about 500 kilowatt charges in the proposal. There are two 500 kilowatt chargers at Navy Pier; so with Chicago & Austin, that's a megawatt of additional service in each of those locations.

We spent quite a bit of time thinking about the pros and cons of the garage versus en route charging. And I don't have time to get into all of the details, but I wanted to say that this question
had a lot of implications for the grid. If we charged in the depot overnight, we could do that on slow charging; but we'd have to charge all of our buses at that central location. We have 1800 buses in our fleet -- over 1800 buses. So if we electrify the fleet, that would have a huge centralized load at our seven garages. Whereas, if we deployed a charging structure for our en route charging buses, we can do that in a more dispersed way, and it spreads the load across many different sites all across the city. The flip side is, though, that we are fast charging at those locations, so the demand is much higher for the 500 kilowatt chargers. The pros and cons is something that we're still thinking through. We're going to see how this next batch operates, in terms of the en route charging, and we'll decide on a future procurement from there. I'm guessing that in the end it will likely be a mix of garage charging and en route charging longer range and shorter range buses. And if you're interested in a good study on this, King County, in Seattle, did a comprehensive study on what it would take to go
durations, and they ended up recommending a mix of longer and shorter range charging of electric buses.

Just a couple of last notes about how we can work with utilities to support this plan. We've thinking about what we can do to minimize the demand charges when we are fast-charging during the day; and so we're very interested in working with the utilities on that. It could be some systems for dynamic charging or demand response. We've also been thinking about how we scale up our on-route charging stations and where we put those; and we'd very much like to look to the utilities for information on where service is adequate now versus where service would be a costly upgrade in the future.

And then, lastly, I just wanted to mention -- I know around the country different utilities have been considering, and in some cases even offering, special rates for electric vehicles; and that's something that we're certainly interested in talking about further with our utility, ComEd.

I look forward to questions. And thanks again.
MS. EMILY BRUMMIT: Thank you very much, Kate.

On behalf of the Commission, I would like to thank the presenters for educating us on the current state of EVs and the impacts and benefits on the electric grid. We appreciate your perspective and expertise on EVs as well as your thoughts on the use of emerging technology in this area.

We will now move into the questions. I will do the questions to the entire panel, and anyone can feel free to respond. And please feel free to dialogue.

My first question is, there's a lot of talk about EV fast-charging. Could you speak to where that technology is heading, its likely use case, and what implications, positive or negative, it might have on the grid?

MR. DAN BOWERMASTER: I'll go first.

So it gets a lot of attention. You've heard from quite a few us up here today. There are many use cases for it. I think the point that the Commissioner mentioned is those who don't have a garage or don't have a place to park overnight; they
might be able to charge it at work. But if you live in a condo, say, downtown here, or an apartment, or even a townhouse with just a parking lot, you don't have an outlet near you; so there's the idea that you need to have kind of EV chargers. And there might be a lot lower power during the day with, say, a bus in Chicago. But there's that kind of use case. And then there's a use case to support all of that extra suburban driving, or if you're going out towards Milwaukee or something like that, out in that direction. And the third use case is if you are driving coast to coast or somewhere like that, you might think of attaching a 2 to 10 megawatt charger. And this is all for light-duty vehicles. As a matter of fact, on any of these vehicles -- you have everything from bus depots that we've talked about, the truckstops; and I think the truckstops are used with the Tesla and the other truck companies. That's when you're talking about the kind of 10, 20-mile megawatt loads in the whole country. So, again, none of these things will pop up overnight. The question is, how do you sort of
scale -- initially, utilization might be lower, and
now that impacts kind of the cost per vehicle. If
you fast-forward 5 or 10 years in future, you're
looking at higher utilization and what are those
costs per vehicle. There's a lot of challenges out
there.

There's some talk now that, if there's
storage on site, with fast-charging, with that
combination of quote, un quote, a more popular
solution than just charging on its own (inaudible).
There's a lot of testing that still needs to be done.

MS. KATIE BELL: May I just also state, from
Tesla's perspective, regarding the super charging
network, we see it as a necessity, in terms of
getting folks from Point A to Point B for long
distance travel. Obviously, we don't see that as the
optimal mechanism for charging. And, ideally, over
time we can move towards charging where we park. So,
for example, getting access to Level 2 charging, in
addition to places of work or other destinations, may
be a more reasonable way to accommodate EV charging
growth, as well as more cost effective.
MR. MIKE WATERS: I concur with both of those opinions. I think EV fast-charging is going to play an important role. It won't replace the gas station model, and it won't be a full conversion of that; but it will be necessary -- at the highest power level, solutions will be necessary to let people charge as quickly as they can and get back on their way; but, again, it won't be the primary. I think we need to be careful on that, in thinking that it would replace everything out there today.

One of the other things that I would point out is the load factor, initially, because EV adoption is growing; it will make it challenging in the beginning to put these in, the demand cards, as they wait. It'll eventually make it more easy, I guess, for them to be able to handle. So there are some solutions that we've seen across different utilities, and they have some special rates to accommodate that in the future.

MS. KATE TOMFORD: I would just add from our operations perspective, if you have a diesel bus that's close to empty and you take it into the garage
to fuel, it takes about 20 minutes to fully fuel that
diesel tank; and that would be about comparable to
fully charging one of our electric buses on a
fast-charger. So from an operational perspective I
think that there's something attractive about
substituting electric charging and gas charging. It
takes the same amount of time. However, as we talked
about, and the other panelists mentioned, really what
we want to try to do is shift the charging to
off-peak times and to lower demands, lower loads. So
it takes more creative thinking about how to change
the operational structure.

Obviously, in an organization like CTA
that's a massive undertaking for even an individual
driver in thinking about how they fuel the gas car
versus an electric car; but that's what's going to be
required in order to make the system most sufficient
overall and have the least impact to the grid.

MS. EMILY BRUMMIT: Thank you so much to our
panelists.

My next question is, one of the newer
concerns with EVs is whether the increase mining of
material used for batteries such as lithium and cobalt will create a new environmental hazard. Do you see this as an issue, in terms of whether or not lithium or other batteries are viable long-term solutions to this potential environmental drawback?

MS. KATIE BELL: From our perspective, we see the life cycle of the battery as a critical component of increasing the amount of EVs, or ensuring that it's a stable process. For example, we are committed to installing recycling facilities which will ideally take in cars at the end of their life and be able to recycle those materials, as these materials are rare and scarce; and it is more sustainable -- it's more beneficial to all, in order to facilitate a closed-loop life cycle for battery vehicles. So we're certainly committed to that.

MS. KATE TOMFORD: We've had some conversations internally at the CTA, just batting around ideas about second use for our batteries. We have, I think, about 200 hybrid buses that will be needing an overhaul at some point in the next couple of years; and that includes a replacement of their batteries.
We did some research into options for using those; and I think there's some general projects out there where batteries can be bundled up and used for storage for renewable energy. But we have not found any easily accessible opportunities, I will say, yet; but that's a market that I'm hoping takes off before the time comes when we need to recycle our electric bus batteries. But it's definitively something that we've thought about and are actually looking for options for.

MR. DAN BOWERMASTER: Just to add to that, a couple -- the regular 12-volt batteries that are in the cars today, the little ones, those are ones that are highly recycled. So the point is that if there's demand for this stuff, there's a process to recycle it.

I also agree with Kate that we're not there yet. There's a lot of learning to be done about how these might be used. So there's quite a bit of, potentially, value there. There's a question of, okay, where this energy ecosystem might make sense, to either use this as it is or refurbish it.
We're not there yet.

COMMISSIONER ROSALES: My question is, so where do you take the battery when it's done, if it's 99 percent recycled batteries?

MR. DAN BOWERMASTER: Just to talk about our gas cars today, I used to go to the battery store, or the auto parts store.

COMMISSIONER ROSALES: You can't take it to O'Reilly's if you have a hybrid.

MR. DAN BOWERMASTER: Yeah, that's a different battery (inaudible).

MS. EMILY BRUMMIT: All right. Commissioner Oliva?

COMMISSIONER OLIVIA: Good morning, everyone. My question is that -- we heard earlier that Illinois is 8th in the nation for EV deployment. So I'm just wondering what state is number one and what are the regulators doing there, policywise and regulationwise, to encourage more EV deployment.

MS. EMILY BRUMMIT: I think that question might be addressed better in Panel 2 unless anyone has something to add.
MS. KATIE BELL: I mean, if Panel 2 wants to take this on more robustly, I think it makes a lot of sense to ask it again. But from at least my understanding, California is ranked number one with the amount of EVs on the road. And they've been extremely proactive from all parts of government from the Commission to legislation to agencies working on trying to promote more electric vehicles.

They also have some really robust targets, in terms of carbon reduction and the pathway to get there through electrifying transportation. So they're very eager, in terms of putting together programs that are multifaceted, from EV incentives to favorable rate designs, that are going to enable more charging infrastructures; and working directly with the utilities to make sure that they are set up in a way to accommodate daily incremental charging that's going to take place within the system; and, also, setting forth, you know, EV infrastructure.

And I think a biggest component that's -- I mean, unfortunately, it can't really be addressed under this forum -- but that's a focus, and
should be a focus here as well, is the interaction of building codes and working with local jurisdictions to ensure that they're streamlining their permitting processing to make sure that you can quickly and easily add charging infrastructure where it's needed. You know, there's been comments about charging stations and is it going to be a gasoline -- or a gas station; and, you know, the requirements for that are completely different.

MR. MIKE WATERS: I would just note that, on the vehicle side, obviously, the car -- the green house gas with reduction requirements out there in California also manifests itself at the Commission level. That's been going on a long time, in terms of utility filing. In fact, in the beginning, they weren't going to allow them to do anything; and then the Commission changed the rules and said, "No, we do see an important role. Bring us your plan, and let's discuss this, and let's create these guidelines and programs that will help." There's some really good analytical data on that.

MR. DAN BOWERMASTER: Just to add to what Mike
said, you know, the states with the most highest population, like California and states like Hawaii or Washington, they're all still in the top five. So as Mike mentioned, you have mandates in states like Colorado. But that we're seeing -- Tesla's global system, they're number one in their class in the U.S., Europe and Asia. It adds another layer of competition with their competitors -- primarily, European.

California and also northeast -- and there's one in the middle -- are starting to form stakeholder groups where you can participate in trying to figure out different issues. And California shifted from just stakeholder discussions to more of marketing the "got milk"-type pushing of EVs.

MS. EMILY BRUMMIT: Thank you all so much.

My next question is, we know that EV drivers would be in control of their charging experience. How does the EV charging industry plan to manage charging while steering clear of potential negative backlash about perceived mandated
efficiency? Will financial incentives be enough to counter consumer sentiment?

MR. MIKE WATERS: Okay. So from our perspective, you know, we've developed things within our network that helps manage the stations and communicates with drivers and the ability to manage loads in a bunch of different ways. We do that with site hosts. So for those that have charging stations you have the ability to actually share power. You can manage your electric costs to deliver that power. And we can also provide those same tools at the aggregate level. So, for example, the site host being granted those access rights to the utility in order to do demand respond at a more aggregate level or at the distribution level, or what have you, for certain levels or higher.

But we think that's really important to have those tools and, again, a network that helps enable that and also provide the data where you can do measurement validation to see when the charging is occurring and how you can impact that charging. I do believe that you have to have the choice and option
there. So with any DR program, participants usually have the ability to opt out. You then lose an incentive, but having that freedom of choice -- that driver, they need to charge. At the end of the day, it's transportation not a hot water heater. It's their car; so the ability to have the option to opt out I think is really important. We have been incorporating those tools. We continue to work with the utilities. We've got the right features to support not only the driver side but also the utilities to ensure that we have sufficient integration of this load moving forward.

MR. DAN BOWERMASTER: To add to what Mike said. I would agree that the charging station companies that are providers are most vehicle manufactures (inaudible). What goes on when you get an EV experience -- I need my car charged by 5:00 or by 7:00 am. You know, I don't care whether you do it overnight as long as it's charged. There's a lot of data out there. (Inaudible.)

MS. KATIE TOMFORD: The transit analog is perhaps a reliability service. They're not making
individual choices about when the buses charge, but they expect the bus to run on time and to get them to the route -- along the route where they want to go. So one thing that we've tried to do in the design of our current deployment -- we have, the RFP -- is to build redundancy in the system. So as I mentioned, the Chicago route is a 10-mile route. These buses are expected to have at least a 45-mile range, and that will allow a bus to skip a charge at one end point and continue on the route. Basically, it can go a full roundtrip without charging at the midpoint.

So we have some redundancy built in. We don't necessarily have to charge at every stop. If push comes to shove and we don't necessarily have to charge at a second stop even, you could run 30 miles and basically do the route three times if you had to. So that will enable us to stay on schedule. It will put less time pressure on the bus operators. If they can't stay at a layover stop for a full 10 minutes, they just have to let people off and turn around. So that's what we've tried to do is build some redundancy into the system.
MS. EMILY BRUMMIT: Thank you.

Next question: Are there specific examples or analogies of other utility programs as they relate to emerging technologies?

MR. MIKE WATERS: I just mentioned a couple of programs that we've been working with. In California they just had a new grant approved. I think those programs are really good to look at because they run the gamut. As I said earlier, there's much to accomplish in which utility programs can exist. They include everything from rebates. They even incorporate elements such as site host's choice of what the solution is and even setting prices and incentives. Massachusetts I think is the biggest one that has an improved program. So I think all of those are good examples to look at.

MS. EMILY BRUMMIT: Thank you.

My next question: Are there other future potential benefits of EVs such as ancillary services to vehicle or to grid power, et cetera?

MR. DAN BOWERM蜈}: All right. So the shortest answer is, yes, potentially. The vehicle's
grid -- you, basically, take power from the battery and you connect it to the charging station putting that power back on the grid and/or kind of controlling the charging to meet the whole fluctuation on the wholesale side; so that is a potential. It comes with a long list of potential complications. What we're seeing now in the market is the -- the stakeholders are working on technologies and demonstrations that hopefully could do that one day, but in the meantime time there's this idea of (inaudible) load or just kind of smart charging it; and Mike talked about this.

Coming back to the benefit question, how do you do that kind of technology onto the car and/or charging station such that it is a grid resource all while meeting the customers needs? So what we're seeing now is more of a focus on what can we do to manage charging that meet customers' needs and that minimize the impact from the substation all the way down to the local neighborhood. The grid investment program, it's an established process as far as what's invested every year and where should
benefits go (inaudible).

MS. EMILY BRUMMIT: Thank you.

All right. My next question is -- so, Katie, I think you mentioned that there are only 15,000 EVs on the road in Illinois out of a projected 100,000. How is the EV automotive industry helping drivers make the switch? What are those ingredients especially that you're looking for to hit that sweet spot where we see benefits?

MS. KATIE BELL: So I think it goes, again, to what I was mentioning in my presentation, which is addressing the question of how much does an EV -- how far can it go. So we've been working on developing products that do --

(Whereupon, Chairman Sheahan joined the meeting.)

MS. KATIE BELL: For example, when we first started, we had a Tesla Roadster. And then we moved to a mid market car. Now we're moving towards producing the Model 3, which is mass market car that can be -- it's at a better price point than let's say the latter vehicle. So we're working on technology
as well as bringing our costs down so that these vehicles can be more prolific for folks to adopt. So that's where we're primarily focusing. We're trying to give customers a better option than what's available today. And so it should be kind of that technology focus to get folks to adopt EVs, in addition to, you know, working on finding ways to make sure that access to charging and costs -- or that the costs associated with charging are aligned with the costs on the grid.

So we think putting together the time use rate is a good way to start that process of getting folks to charge off-peak or paying for the cost of what it would cost to charge on-peak. We see that as the first steps.

MS. EMILY BRUMMIT: All right. My next question is, what are the potential utility program designs and partnerships that you see that can help support EV adoption and encourage off-peak charging?

MR. MIKE WATERS: I'll add a few things. When we look at rate design, smart home charging is a really good place to start when we look at how do we
capture some of the low-hanging fruit, in terms of what it costs on the grid. And I think we've seen programs where there's either a demand response program to encourage charging to occur after a certain time or a reduced charge rate at a later time. That's very similar to those demand respond programs on a water heater. We've seen others that look at the data and, essentially, do reversal EVT of the new rate. So instead of having a separate meter installed, we supply charging stations in the home. So there's actually limited data from the embedded meter in the charging station and, retroactively, rewards the customer for any off-peak charging; either via a rebate or on the bill. And I think ComEd in New York City has a really good program that does just that.

On the DC side of things, I would just mention Southern Cal Edison had a proposal looking at more polymeric rate designs to supply DC fast-chargers in the beginning for the first 5 years and then transitioned back to a demand charge rate schedule; and that was to help, again, with that load
factor issue that often occurs in the beginning of the market adoption.

MR. DAN BOWERMASTER: I would add that the utilities are in a unique position. There's a difference of what brand of vehicle -- there's a lot that's been done over the years even on the C & I side, the commercial and industrial side, like the forklifters and things like that. Utilities have extrication experts to go out and work not only within the utility but to get distribution folks involved. They work with their customers and the account reps. Again, you want to serve as an indifferent energy provider. (Inaudible). There are a lot of options out there that utilities use across the country on the education.

MS. KATE TOMFORD: I'll just mention that we've had experience working and had a lot of support from them on planning this next round of charging infrastructure, the round that's going to be on route. We, initially, talked with them when we knew we had grant funding to go out for that bid; and we asked them, across about 10 different bus terminals,
which ones would be most ready to support two fast-chargers. And they came back and they said, "Well, there's capacity here, but in these other places you have to make huge expensive upgrades."

So we found it very informative, in terms of trying to gauge what our overall project cost would be to talk with them and to understand what their capacity is around our whole footprint of terminals throughout the city. I was hoping that we can continue that conversation with them. And we could be proactive about it. We were able to get some sort of map and actually plan out, in the longer term, ways where we want to deploy and where service upgrades will be made, according to our plan. But it's been a good working relationship, and they've been very supportive from that planning standpoint.

MS. KATIE BELL: And that translates even down to just the consumers and those that are using Level 2 charging for individual homes, maybe not the home, but definitely when it comes to citing Level 2 charging destinations. I haven't seen a program yet that the utilities proposed to make their system
planning more transparent for the purposes of sighting an electric vehicle infrastructure; but they certainly have been a strong partner in providing that information when there is direct outreach to them. So I think that's a really important point because part -- you know, there's one part of the cost of adding the incremental load at certain times -- but there's also the fundamental that there is parts of the grid that are just generally underutilized. So if you are able to target those specific locations -- and it could be just as simple as charging on one side of the parking lot versus another -- you can leverage the system in that way as well. And so it's a really cost-effective and beneficial way for EV charging development and utilities to work together to make costs lower.

MS. EMILY BRUMMIT: Thank you all so much.

We have time for one more question from the audience. If you have a question, please identify your name and organization and present your question.

MR. ROB KELTER: Rob Kelter, Environment Law &
Policy Center. My question is for Kate. You talked about charging -- the need to charge buses during the day. Have you thought about trying to use solar power to charge buses during the peak times.

MS. KATE TOMFORD: We have thought about that. We've thought about doing a system that has solar and storage integrated with EV charging. And, in fact, in our current proposal we do have an option for storage of some sort. We do not have any solar installed currently at CTA, but there's a thought toward partnering that storage, solar and EV charging. I think it would potentially work well at one of our bus garages because those are generally one storage building with a huge flat roof. It's a thought, but it hasn't been planned specifically yet.

MR. DAN BOWERMASTER: To add to that, school buses fit the kind of driving pattern that Kate mentioned earlier. (Inaudible.) It demonstrates -- or looks at the potential integration of kind of midday solar charging with the school buses. So the industry is looking at it.

MR. ROBERT KELTER: Just one more point on the
school buses. During the summer when you e-power the buses at peak times, the school buses are often not used to being used as batteries to put electricity back on the grid. So there's a lot of societal value to the school buses.

MR. DAN BOWERMASTER: Yeah. The other part to that school bus project we'd like to look at is what's called vehicle to load. That's, to a military base, kind of like a local neighborhood. (Inaudible.) School buses can be used in case of emergency, a natural disaster or something like that. It could be used as a source (inaudible). Yeah, we agree.

COMMISSIONER ROSALES: Before you leave, if I could get in a question?

MS. EMILY BRUMMIT: Yeah, of course.

COMMISSIONER ROSALES: And it's not really a question. I just want to let you know that we have the Next Grid project here in Illinois. By the end of the year we will have a number of discussion points; and the one thing that we're working on as emerging technology and being part of that group is
EVs. We don't see how EVs are not going to be incorporated in moving forward in the industry. How do we get there?, is the question. And what we're looking for from you, from all of you, is help us. Help us help you in how it's constructed. Because -- and I know Sue is coming in later on -- we have a number of push-back from customers that are discriminated against because they live in the city; and it's something that we need to address.

We've been able to address it with future solar. We had solar programs and if you didn't have a home, you could work and get involved in a solar project where it's not in your home. But for this EV project, this needs to be addressed. It has to be addressed. And I addressed this with Tesla. When you live in the city, how do we go about where it's not the have and have nots and folks in the suburbs that have a garage and can plug in and the folks who live in 3-flat, or 4-flat, or a 6-flat -- where do they go? And that needs to be addressed.

I know the easiest solution will be to
put in these charging station every 15 feet on the
streets; but that's not going to work. So as we move
forward, those are the kinds of questions that we're
asking from the Commission. And we appreciate you
being here. Thank you.

MS. EMILY BRUMMITT: Thank you, Commissioner
Rosales. That's all of the time we have for
questions. But thank you, again, for everyone's
participation. Let's give everyone a big round of
applause.

(Applause.)

MS. EMILY BRUMMITT: We'll reconvene in 10
minutes. Thank you.

(Whereupon, a brief recess was
taken.)

ACTING COMMISSIONER PALIVOS: Welcome back. I
would like to, again, thank our panelists from Panel
1 for sharing their insights and perspectives for the
benefits and impasses of EVs. Our next panelists
will discuss EV policy and regulation, how we're
governing electric vehicle growth in Illinois, and
how Illinois stacks up to other states. To lead our
discussion, I would like to introduce Meagan Pagels, Special Assistant to the Executive Director here at the ICC. Please join me in welcoming Meagan.

(Applause.)

MS. MEAGAN PAGELS: Thank you, Commissioner Palivos. As the Commissioner said, my name is Meagan Pagels, and I will be your moderator for Panel 2 this morning. The purpose of this panel is to discuss the legal and regulatory framework that exists for electric vehicles in Illinois and in other states with successful electric vehicle deployment and programs.

The format of the panel will consist of brief presentations by each of our panelists followed by a series of questions. Upon reaching the end, we will also take questions from the audience.

Before we begin I would like to introduce our panelists. And I'd also like to point out that this is a fabulous and dynamic all female panel today, so that's very exciting.

(Applause.)

MS. MEAGAN PAGELS: First, we will be hearing
from Elizabeth McErlean, an energy attorney with Mcguriewoods. Next, we will hear from Christie Hicks, the Manager of Clean Energy Regulatory Implementation at the Environmental Defense Fund. We will then hear from Susan Satter, Senior Assistant Attorney General at the Office of the Attorney General. And, finally, we will hear from Jane Park, the Vice President of Regulatory Policy & Strategy at ComEd. Please join me in welcoming our panelists.

(Applause.)

MS. MEAGAN PAGELS: Elizabeth, feel free to begin when you're ready.

MS. ELIZABETH McERLEAN: Thanks, Meagan.

So today -- well, first, I want to thank Acting Commissioner Palivos for inviting me to speak here today and the rest of the Commission for providing a forum to discuss this very important issue and topic.

As Meagan mentioned, am I an energy attorney at McGuirewoods, and I counsel investor-owned facilities on a variety of regulatory issues, including energy efficiency and renewable
portfolio standards, net metering, conserving generation, and energy procurement. And, as an attorney, I'd like to preface that today this presentation and my remarks are my own opinions and not those of my firm or the clients that we represent.

So in order to facilitate the discussion of whether electric vehicle regulations in Illinois are designed to encourage optimal energy efficiency, I'm going to give a very high overview of the legal and regulatory framework in Illinois as it relates to electric vehicles. Currently, Illinois's framework is what I would characterize as light, in that Illinois does not heavily regulate electric vehicles. And it's also important to acknowledge that the Illinois Public Utilities Act does not regulate electric vehicles themselves, but it regulates the service of charging electric vehicles. This, however, is a very important function given that the widespread deployment of electric vehicles will largely depend on charging stations.

So to the extent that Illinois law
does govern EV charging services, is does so with two primary functions: market entry and consumer protection. So, first, with respect to market entry, one of the biggest questions regarding electric vehicle charging stations is whether they should be regulated as public utilities. There are a number of different entities that will likely assume the function of EV charging service providers, such as employees with their employers and employers with their employees, landlords and tenants, and commercial individual charging station owners -- that would be more of, like, a residential owner. So the question of how these entities are going to be regulated is largely dependent on each state law, and it's largely dependent on the policies of the Public Utility Commissions. So there's often questions of whether an EV service charger should be regulated like a public utility that delivers power to homes and business. Illinois has answered this question expressly. In 2012, the Illinois General Assembly amended its definition of a public utility to add a new subsection that
specifically exempts EV charging station owners from the definition of a public utility; and it also makes clear that such entities will also not be deemed as sellers of electricity. And this is pretty important because Illinois, in 1997, deregulated the competitive electric grid service market by introducing competition. So now customers have the option -- instead of just purchasing their supply from their electric utility, they can also go out into the market and elect to buy power from competitive suppliers.

So by ensuring that an owner of an electric charging station will not be deemed to sell electricity, the General Assembly seemingly sought to encourage private investment in the development of EV charging stations. And so, accordingly, it opened up the possibility that a number of different entities, regulated or not, can assume the electric charging service provider role. And this is also very important because it's giving Illinois some leeway to best develop an EV charging service market to best suit the needs of our customers.
And it's important that Illinois' regulatory framework currently mirrors -- the exemption itself currently mirrors exemptions in states like California, Oregon, Colorado, Florida Hawaii, Maryland, Minnesota, Washington, Virginia, and the District of Columbia. And there's also an interesting aspect about Illinois exemptions because it contains a pretty important caveat pertaining to the electric utility itself. So while an EV charging service provider is neither deemed a constant public utility or deemed to be a seller of electricity, if you are other otherwise already a public utility, the other provisions of the Public Utilities Act will still apply. However, because the Public Utilities Act is silent as to how the utility itself should be providing these services, it's seemingly leaves it to the utility to best determine how it should offer the service of EV charging.

Second, Illinois' framework also encourages consumer protection. For example, Part 469 of the Commission's Rules addresses the certification for the installation, maintenance, and
repair of all electric vehicle charging stations.

Under the Part 469 Rules, a certification is required for any entity or person that installs electric charging stations in Illinois. But you should note that these provisions don't apply to self-installers or persons that choose to buy and install the charging stations for their own personal use at their home. Installers are also subject to annual certification requirements and reporting requirements, and they must include listing all employees, providing liability insurance, and recording any and all stations that they place in the state. The goal is to also require a lot of the utilities to verify charging stations that are installed and to clarify that utilities have filed tariffs with the Commission setting forth the documentation that will require -- or the entities that provide the charging station to customers.

Lastly, the rules authorize the Commission to investigate all activity related to the certification of charging stations and to assess penalties for any non-compliance. So, as I expressed
before, it's pretty light in Illinois; but going
forward there are very important considerations that
policy makers will need to consider. And the
exemption of charging station owners from a public
utility and the rules regarding certification I think
strike an appropriate balance between encouraging
private investments but, at the same time, ensuring
that the liability needs are still best suited for
our customers.

Going forward I would encourage policy
makers to develop industry standards and policies
that promote EV deployment, while still ensuring that
environmental performance and its integrity of the
grids they maintain. And there's also going to be
issues with social and demographic equities that will
need be considered as well as intelligent rate
design. There's a lot of unanswered questions in
Illinois, but we're here today to discuss the
industry going forward. So thank you.

MS. MEAGAN PAGELS: Thank you, Elizabeth. And
next up we have Christie Hicks.

MS. CHRISTIE HICKS: Thank you. My name is
Christie Hicks. I am the Manager of Clean Energy Regulatory Implementation for the Environmental Defense Fund, and I am based here in Chicago. I'd like to thank the Commission, especially Commissioner Palivos, for the opportunity to speak this morning on this timely and important topic and with these very knowledgeable panelists.

So we have had a particular interest in electric vehicles, as fossil fuel has had an enormous impact on our climate and our health. The transportation sector accounts for about a quarter of all greenhouse gas emissions globally; and transportation is the second leading source of greenhouse gas emissions in the US, just behind the electricity market. Cars and trucks are responsible for more than 3 quarters of transportation sector emissions -- aviation, shipping; and electric vehicles offer the greatest emissions reduction potential in the transportation sector.

After a record year for EV demand, as Commissioner Rosales noted earlier, the question is not whether EVs are coming but how. Several
countries and car manufacturers have made commitments regarding EV sales and even the abolition of internal combustion vehicles. China is maintaining that EVs will provide an increasing percentage out of all vehicles sold starting in 2019. Ford is getting ready to build EVs in the U.S., Mexico, and China; and GM claims an all-electric future. Sales of plug-in EVs are increasing by 30 percent every year, and they offer a substantial opportunity to curve prices on emission and improve local air quality.

The potential climate benefits increase dramatically over time. Our projections are that they can increase from 125 million tons of CO2 per year, in 2030, to 1.5 billion tons of CO2 in 2050. The future is electric. And hundreds of thousands of EVs will be distributed in the United States over the next few years. This is a critical discussion, as we look to improve the outlook of EVs for all communities in Illinois and prepare for the tons of owners embracing sustainable technology.

Autonomous vehicles and car sharing mobility services may fundamentally disrupt the
passenger market -- I'm sorry -- the passenger vehicle market, and they offer a unique opportunity for electrification. Mobility services like Uber and Lyft have become ubiquitous; and depending on how they're deployed, autonomous vehicles and ride sharing vehicles can either significantly increase emissions or complement the emission reduction efforts.

Over the next few slides we'll look at EV adoption in the U.S. You'll notice that Illinois is not here on the Top 10 slide here. As we discussed earlier, although Illinois' overall EV deployment is Top 10 in the nation, when you look at per capita, Illinois is actually behind in the national average. California leads. They have over half of all EVs in the US today and the greatest number of EVs per capita. There is a zero emissions vehicle program that is going to be a part of that, where ZEV credits are earned based on the type of electric vehicle and the battery range. And several of the other top 10 states that you see listed here have also adopted the ZEV program. And here you can
see many. Whereas, Illinois falls just a bit out of the top 10 as far as EV deployment per capita. California is currently piloting various charging programs where infrastructure may be owned by a utility or may be owned by a third party; and there are various incentives, from variable pricing programs to ratepayer funding to rebates. Other states, such as Oregon, allow utilities to invest; and for a return on their investment, a rate-based charge at an electrification infrastructure (phonetic). And there's other initiatives in states like Hawaii that we talked about earlier that are much similar, just providing EV owners the location of nearby pull-up charging stations via an app or a website.

Illinois, while in the top half of EV owners, lags in EV charging stations still in per capita and is below the national average there as well. We discussed earlier a number of barriers to adoption; so I won't spend too much time on that. High costs have been a barrier, as well as years of low travel range. So they need to
be confident that their cars can get where they need to go, especially if they don't know that there's going to be a charge point where they're going. And the availability of public charge points and workplace charging availability is directly linked with EV markets updates. This also leads to EV model availability and updates. And while the leading states have at least 24 electric vehicle models available, across the country about half the population has access to tons of EV models today.

There's a number of potential initiatives -- and this doesn't cover them all -- to bring benefits of electrification to all communities; and EDF and others are employing these. There's first rebates and tax incentives that will increase awareness and reduce the initial cost per year for EV ownership, utility rate design; the Bureau Emission Vehicle Program can be adopted nationwide. And instead of riding availability, just more EVs at dealerships or allow indirect sales of EVs to customers.

So free charging is one of the things
that's frequently talked about, but there is a number of opportunities to be maintained in these communities and a few of them that EDF talked about includes subsidized EV car charging, subsidized EV car sharing program, and EV mobility services that can make them accessible to a wider population. EV shuttle services could connect to EV transportation under model solutions that would increase transit ridership and have the opportunity to displace an entire car community that was previously necessitated by an inability to access public transit from where we live. Now is the time to investigate the way to maximize emissions reduction; and it's more how they can best benefit the environment of residential customers.

EDF is currently analyzing data from around the country, the local pilot programs that provide the best information. We should create and explore events that keep these businesses down and provide maximum benefit to the grid. For example, comparing options such as managed charging versus time of use rate or maybe using both. We can take
advantage of opportunities to reduce bills for everyone if we correctly consider which programs or combinations and incentives will provide the greatest benefit to customers, the environment, and the grid.

I look forward to hearing from my fellow panelists and taking any questions later on.

Thank you.

MS. MEAGAN PAGELS: Thank you so much, Christie.

And next up we have Susan Satter.

MS. SUSAN SATTER: Good morning. Thank you for having me today. I appreciate the opportunity to talk about EVs. As some of the prior panelists have noted, today EV penetration is low in Illinois. So of the -- this is 2016 data -- there have been 10.5, approximately, million vehicles on the road, and about 12,000 are EVs; and this is passenger vehicles. So that's .1 percent.

So I'm just curious. This is a room full of people who understand electricity and who are involved in the industry. How many people have an EV? (Pause.) So four or five. That's not
representative of the state as a whole, but I think it's important that, when we talk about EVs, we understand the experience of owning an EV. I have an EV, so I feel like I can offer that today.

80 percent of EV charging is done at home in the garage. Nissan did an interesting study that showed that people who work for employers who had an EV at work do 90 percent of their charging at home or at work. So as somebody this morning said, EV charging is done while you're parked. There's no special chart for charging ordinarily. So when we talk about charging stations, we're talking about filling in, right -- filling in for the charging that's not done at home.

Commissioner Rosales asked a question about, What do you need to charge an EV? And I've got a little picture there. If you'll see, it's a 3-pronged plug. And when I bought my EV, I drove it to the garage, and I plugged it in. And, sure enough, the light was green; and I was charging. That was it. I just plugged it into an existing outlet. It has to be grounded. If it's not
grounded, it won't work. But you can go -- for example, if I go to visit family and they have a garage and they are willing to allow me to use some of their electricity, I can just plug it in.

COMMISSIONER ROSALES: Is that your garage or a communal garage?

MS. SUSAN SATTER: What's that?

COMMISSIONER ROSALES: Is that your garage or a communal garage?

MS. SUSAN SATTER: Oh, no, no. It's a single-family home, so it goes onto my electricity bill. Now, if it was a communal garage, then the question is, Who is paying for that electricity?

And I just wanted to mention that home charging stations can be Level 1, which is you plug it in. They can be Level 2, which is higher voltage, which I understand is basically the same as what we used to put in when we had window air-conditioners and people needed more power. You don't really see that anymore because we have mostly central air, but it's kind of the same thing.

But what about when we're away from
home? Most charging stations are Level 2. They can be a public or private parking lot. There's pay for charge; for example, Charge Point, who was here this morning. My experience with Charge Point is you pay an hourly rate for the electricity. I've seen $2. I've seen $5. So depending on how much charge you can get, $5 an hour does add up. So if you have -- if you require 2 hours for, say, 40, 30 miles, that's $10. Somebody's got to sit down and do the numbers and see if that makes sense. My impression is that that's a fairly high charge.

Then there is also, of course, the free chargers. I've got a picture. I think you can see it. Volta Charging has a business model where they've installed free charging stations primarily at leave-in shopping center lots, lots where the owners want to encourage people to come and stay for a while. So the charging is free for the customer. Usually it's a 2-hour maximum. They tend to be Level 2, but it's a nice little perk. The only problem that I've seen with those is they tend be kind of far, deep in the parking lot; so you have to walk a
ways to get to where you're going. They're not the prime locations in the parking lot, but still it's free parking -- or free charging; and it's a free parking lot, so it does encourage people to come in.

And I also understand that some public entities in some cities are encouraging charging by having low cost or free charging stations. But the point is that there are a lot of different models for charging. So you can have a the hourly charge. You can have the charge at home. You can have the charge by the employer. And you can have the free charge. So all of these models right now are competing and are offering consumers a bit of choice as to what they want to do.

I look at the Illinois cities that have identified charging stations within 15 miles; and that's a fairly broad range. You can just see the numbers there. I think I've already mentioned this, you know, who owns the EV charging stations and where are they located. There are some examples in this slide. For example, Walgreens has adopted EV. So you can go to just about any Walgreens -- and we
know that Walgreens are all over the place -- and they'll be a charge point location there. Hi-Vee grocery stores in Downstate Illinois; Whole Foods offers free charging in some of its locations. There are also many maps and apps, so you can find where charging stations are available. These are just -- on the right is a map from -- I believe this is one of the charging sites. They identify 948 developments in Illinois. I'm sure that's changed. These apps on the phone -- so you're driving around. You want to check something. You pull up the app on your phone. On the right, that's the Charge Point's app; and it's easy to find. Range; I just wanted to lay out what the ranges are for the different types of vehicles. So Chevy Volt being one of the first EVs, relatively small range, but it's a hybrid, so gas pricing is okay. The Chevy Bolt, 238 miles is what they claim. The Nissan Leaf, you can see these ranges up here. But then you compare that to a gas tank, which is approximately 500 miles; so it's just a different scale. And then there are a lot of things that
affect the range for your EVs, such as outdoor
temperature. Is it hot or cold? How are road
conditions? Are you going up or downhill? Traffic,
use of care conditioning. All of these things affect
how many miles per kilowatt I'm going to get.

So as an owner of an EV, you want to
analyze. Are you going to buy it and forget it, or
do you want to do some analysis? So assuming you
want to do some analysis, I think it's really
important for the utilities to have information
available. Now, I was able to pull this up from
ComEd's hourly pricing program; but I was not able to
get it off the ordinary site. I'm on hourly pricing,
so I have the price signals to charge at night; but
the information about charging isn't up for 3 days
and I forget -- I forget how much charging I did and
what the status of my car was 3 days out. So if I
wanted to check how many kilowatt hours I used, I'm
kind of in trouble. It changed, if you want to look
at this slide later, in October of 2017. This just
shows mileage. I get over 250 miles a gallon
lifetime for my car.
Then Policy Implications -- you always have to have a dog in your slide. This is a dog being pulled in different ways. When we develop policy, I think we have to keep in mind basic facts. 80 percent of charging is done at home; and even a larger percentage of charging is done at home or the workplace. So what rate designs are appropriate under those circumstances? There's delivery service rate design as well as supply rate design. Right now you can get a supply rate that reflects time of use. We do not no have delivery rates that do that.

The other policy point that I wanted to make is that today there is a market for all different types of charging stations. I think you have to be very, very careful of adopting policies that assume that the utility is the appropriate or the sole developer of these charging stations. Thank you.

COMMISSIONER ROSALES: Is that your car, Sue?

MS. SUSAN SATTER: Yes, it is.

COMMISSIONER ROSALES: It had Susan on the license plate, so I kind of figured.
MS. MEAGAN PAGELS: Thank you so much, Sue.

Next up we have Jane Park.

MS. JANE PARK: Good morning. Thank you, Commissioner Palivos. I really appreciate you holding this session on electric vehicles. I really want to thank the Commission. This is a pretty important topic that we're dealing with and one that is very timely.

So what I plan to do is really take this topic from the utility's perspective, and not just coming from the perspective in Illinois, but to your question earlier Commissioner Oliva, sort of what are the utilities, and regulators, and policy makers in other states doing. And then we can sort of talk about and at least discuss here in Illinois.

So, very briefly, ComEd's plans -- one thing that's key -- and we'll go into it in a little bit -- is that we are over 3 million smart meters into our smart meter deployment; so we will be finished with about 4 million smart meters by 2018. And I'll talk a little bit later about why that's a very interesting fact for Illinois and the policies
We've heard a lot about the legal framework. I want to just kind of pull it up a little bit and give people a little bit more context, because here in Illinois, unlike in many other states, we have two pretty foundational laws that we should keep in mind when we think about electric vehicles. One, we have the smart grid that, essentially, helps create a more reliable and modernized grid thanks to a $2.6 million dollar infrastructure investment program; and it really sort of helps our then aging grid. And, more importantly, when we talk about that AIMA (phonetic) benefit, it helps us create, essentially, a digital network on our grid; and that communications network is creating, essentially, the backbone for a lot of the applications that we even heard about in this room.

You heard Mike Waters from Charge Point talk about how EVs have that sort of almost consumer electronic aspect of it. There's a lot of two-way communications. You just heard Sue talk about how the benefits of knowing her usage and being
able to participate in an hourly program, all of that that helps you optimize the EV. Illinois has already put -- or is in the process of putting the foundation in place for that, from a policy and regulatory perspective.

The Future Energy Jobs Act, there's a typo in there. It's actually December 2016. It's only because all of the years -- my memory is going, but it's past 2016; and that's sort of pivotal for another reason, because what it reflects is real growing consciousness of an increase emphasis by the State of Illinois policy makers on the importance of decomplication and the importance of rule. So what we really see there is a recognition that distributed energy resources are coming, and we've got to figure out what they mean to the grid. And we'll talk a little bit about other states have done in terms of that as well.

So I've spent the entire time listening to about four different versions of how many actual EVs are here in Illinois. So I'll be the fifth only because it's kind of difficult to ever get
the exact stat. So this slide just reiterates for people that we have about 13,000 EVs in Illinois in our service territory and about 420 public charging stations. So what that slide really should tell you is this is the beginning of the story. It's not the end. And what we're really seeing right now is a confluence of technology forces and just policy forces nationally and internationally driving that number up. So, for example, I think it was the gentleman from EPRI, Dan Bowermaster, who came and showed you a lot of what's happening with technology prices. This is just one other snapshot of that. I think you can see here that EVs are expected to, basically, reach cost parity (phonetic) with internal combustion engines in about 7 years. And if you look at that bar graph, that red is really showing you the declining price of batteries and kind of showing you that, as that technology gets cheaper, you're going to see greater cost parity. So that's just one example of where the technology is taking you.

The reason I like this slide is because it helps us pull up -- as a state, to sort of
ask ourselves internationally, and even from an industry perspective, What is really happening here? So at the top you heard Christie Hicks from EDF talk about China. I'll add that the U.K., France, Norway, and the Netherlands, these are countries that are actually going above and beyond and actually starting to place limitations on the number of fossil-fueled cars that they will allow in their country at a future date. So you see internationally countries are moving to recognize the need to pair electric vehicles with their decarbonization goals. That middle section tells you that the industry is getting involved. You see IKEA, Hertz, HP; all of these companies are joining and trying to improve (inaudible) and really talk about how they can grow electric vehicles within their own business from a business perspective.

And then I think at the bottom you hear a little more about this. I think someone mentioned how the auto makers have responded. The fact that they have 22 auto makers announcing plans to introduce 38 different models, that shows you that
from an industry perspective things are moving forward. So the story line for this graph, this statement and slide, is that really right now is a very interesting time. There's a confluence of factors. That doesn't always happen in history; and it happens to be happening right now with the industry, policy makers, and environmentalists; and it's probably time we pay attention.

So you've seen this in different ways. Christie actually commented about, I think, very similar data. I'm just going to show you it in a map format because it might be easier on our eyes. This is actually data from the U.S. Department of Energy, and it kind of shows you that they have sort of correlated EV registrations in each of the states. So what we really see here, and what other people have said is California is the leader -- pretty much the undisputed leader by far. It has, like, over six EV per capita, per 1,000 people in this slide. Hawaii is a stepping place; and then the rest of the states to sort round that out are Washington, Oregon, and Vermont -- that's the one little green state over
in the upper right -- and Georgia. Illinois is, essentially, less than one electric vehicles per capita, according to this. Even Michigan is ahead of us. So I think there are a lot of different ways they can set the data. I think this really shows that Illinois does have more to go -- or farther to go, and that there are some leader states.

So this sort of leads me to the next part of the discussion, which is really, What are these other states doing? So I really tried to pick three. I tried to pick California, Hawaii -- so Number 1 and Number 2 -- and then I picked Georgia; it's sort of on the eastern side. So with respect to Georgia and Georgia Power, just because of time limitations, you know, at the end of the day Georgia is doing a couple of really interesting things. They started out giving like a $5,000 credit to people who would buy EVs; and that made a huge difference in their numbers. They have also put together a pricing program, like whole house TOU (phonetic). That, basically, means that their customers can take advantage of those item prices, right; and they only
have one meter. That meter is all of the energy in their house, including their EV. Some other states have EVO trade. And then they also have a grab bag of other incentives as well.

Hawaii Electric Company is kind of similar. What they have added onto that is a high-level policy mandate for clean energy. So Hawaii has really come in here and, in 2008, established a clean energy initiative saying they want 70 percent clean energy economy by 2030. So they have a similar combination of some large scale policy mandates on renewables and decarbonization along with some dynamic pricing plans and various other incentives. Both Georgia and Hawaii have led their utilities to be involved along with others in charging infrastructure, primarily in areas also that are more community-based.

And then you see on the next slide what California is doing. So California is pretty much the leader in large part because, as we know, they've had incredibly ambitious environmental goals. Right? They want 50 percent renewable resources by
2030. They're trying to reduce petroleum use in cars and trucks by 50 percent. And, candidly, they actually have a zero initiatives vehicle mandate where some of the auto makers are supposed to buy or have only a certain number of fossil-fueled based cars. They also have legislated a rebate clean vehicle program that gives people about $7,000 for their vehicle. So you see that there's a series of policy initiatives that are happening in California. At the same time, I think you're going to hear from one of the Southern Cal Edison folks this afternoon.

The utilities themselves are involved in a lot of dynamic pricing. They're doing various different types of TOU rates as well, and they have, also in conjunction with their public utility commission, gotten involved in investing strategically in charging infrastructure. And, finally, they throw in a variety of other incentives to kick start into options.

So I'm going to pull back for a minute because what all this really shows us is that what we're seeing in the states that have the highest rate
of EV adoption are, essentially, a portfolio of efforts that are being put together; and they sort of start with a portfolio of having some type of policy objective or some type of renewable goal. In Illinois we have our RPS, Renewable Portfolio Standard, to begin with. And then you also see a lot of these states moving towards some type of dynamic pricing or regulatory rate design. Illinois is -- we're actually the leader in this already. We have hourly pricing, which is about as dynamic as we can get, in terms of pricing programs. They tend to have some type of rebate or financial incentive where the utilities and various other private entities can try to work together. They have some sort of set of efforts to help infrastructure preparedness, whether that's doing some make-ready work to make sure that the grid is ready, or selectively putting in certain charging infrastructure. And I think the fifth thing that's not necessarily shown here is that they have conversations about access for low income communities.

I really enjoyed Kate Tomford's
presentation. I always do whenever she talks, because there is always conversation of how we help low income. So we have issues, like the CTA, in Illinois working with electrification school buses, fleets. And these type of access questions are really not as much of a technology question. There's a gentleman in the audience who was on the Next Grid panel with me -- Keith, wherever you are -- and I think he made a point that really made me think. He said access for low income is not so much a technology question; it's a policy question; it is solvable. And it really just depends on whether the policy makers want to think about how those types of incentives and what that portfolio looks like.

So I will end slightly over time with this final and with three sort of settlement points. When you look at what the leading utilities or leading states in electric vehicles are doing, they're doing three major things. One, they're experimenting and trying a portfolio of different types of options and incentives. Not anyone of them would claim they are right, but they are definitely
trying to investigate it. Two, I think they're not prematurely closing out any options. I agree with Sue to that extent. It's too early. There is no data. We need to really keep our minds open and not make judgments. And, three, and finally, this is what the slide goes to; What is really the right paradigm or collaboration for electric vehicles in Illinois? Is it really one where we should be worried about and working together in a series of partnerships (inaudible)? And I think it's that last piece that the utilities are really thinking about.

So my apologies for going over time, but that's the end of my presentation.

MS. MEAGAN PAGELS: Thank you, Jane.

Commissioner Rosales?

COMMISSIONER ROSALES: Thank you, Meagan.

Jane, is there a correlation between those dates and I would say inadequate public transportation? I mean, look at California. They don't have that, and their entire transportation relies on vehicles. Hawaii -- we just had a policy session last week and found out that there's actually
no (inaudible) rules in Hawaii. And I'm not really sure about Georgia. However, there seems to be -- there's a trend here that if you are vehicle dominant, it maybe a good idea; but in states that are not, are there different polices for different places? I don't know.

I'm just saying that the California part -- you know, they have eight lanes. At some point you have to stop. However, if you're slowed down in your vehicle, I understand where you'd come in. But, in terms of emissions, someone like Illinois, we have public transportation. It's little bit different story.

MS. JANE PARK: I think you would need to really crunch the data and actually be able to look at those studies, because I'm sitting here today and can't give you a comprehensive answer. But there are two really interesting points that come from what you just said. One, I actually really agree with this premise that, when you think about electric vehicles, it's such a multifaceted problem. It's not just an energy sector problem. And your question goes to the
heart of it. Right? It's energy plus transportation; and I think the Illinois Commerce Commission is so well-positioned for this because you regulate both. You are truly at the nexus of both of these areas; and I think these are part of the questions that can be tested out and examined and should be examined.

The second point that I would just -- you can't see it. I only know it because I know, because even I can't see it. In that far right corner is DC. DC is actually, like, a 1.52 or something like that. That's an example of a high-metro area which has very good public transport, but which is also doing -- has more EVs per capita than Illinois.

COMMISSIONER ROSALES: That's because there are -- because of the federal government mandate on vehicles that they purchase.

MS. JANE PARK: Potentially. But this goes to show you that, when you actually look at the upper right New England part of that map, you would think you might not find anybody that is any state that is
high (phonetic), but you do. And so part of the question is we should start examining what is that nexus and why.

MS. SUSAN SATTER: If I may, Commissioner Rosales, it's same thing about California. I'm not sure that it's really an appropriate model, particularly for utility investment using charging stations because of the incredibly heavy reliance on individual cars and the pollution problems in Southern California. They have a mandate and a medical need -- a health driven need to reduce fossil fuel usage in the transportation sector, where here we have the CTA; we have Metra.

And maybe when you're talking about policies, if your goal is to reduce emission, maybe the policies that have to be at the forefront are shifting to public transportation, shifting to walkable communities, shifting to bicycles. If you're talking about policy planning at that high level, then I think all of those things have to be put in the hopper, not just that we want to promote EVs.
COMMISSIONER ROSALES: Okay. Thank you.

MS. MEAGAN PAGELS: Thank you. And, Jane, just going off of your presentation, I was just curious, are we seeing any trends between deregulated states and integrated states; or does it not really make a difference?

MS. JANE PARKS: I haven't seen any trends that I'm aware of. But, I mean, obviously, I'd throw it over to the audience. You've got a number of experts out there.

MS. MEAGAN PAGELS: Okay. Well, I will just jump into my first question, then.

Elizabeth discussed about the ICC's authority to regulate EV charging infrastructure and legal and regulatory environmental Illinois. Elizabeth, can you weigh in on how the ICC can be influential, if at all?

MS. ELIZABETH McERLEAN: Yes. So I think the ICC is going to be playing a very critical role in incentivising EV deployment. As we've heard, obviously EVs are going to present new load growth and present new demand. Reliability and quality of
service is at the core of state regulatory responsibility. And although we don't have a clear mandate in Illinois with regard to decarbonization or with regard to specific EV policies, we do have a more general public interest statutory framework that would permit the ICC to get more involved in incentivising EV deployment. And I always think that, you know, regulations hasn't always traditionally been focused on end use. But given the intermittent load of EVs, it may warrant more specific policies and programs to address those different types of needs that are going to be coming as we begin. So we kind of need to be more forward-looking that involve the Commission hosting the session today and the Next Grid meeting where we are sort of discussing these issues because, yeah, I think the ICC is playing a big role.

COMMISSIONER ROSALES: Elizabeth, wouldn't that be more of a legislative incentive than it would be for the ICC? And this is where we're at. I appreciate, again, how well this works out with ComEd being here. Should ComEd be the incentivizer because
of the amount of -- and I'm just throwing this out --
because of the amount of additional electricity
received? Is there enough incentive where we're
smiling? Because we've constantly heard through
every panel session about the static growth of
electricity, but EVs are one of the avenues that
actually are going to project some growth. So
there's going to be some growth.

Is there incentive there to incentify
them by having them look -- like Georgia did with
$5,000, which is always great when you have those
resources from the state?

MS. ELIZABETH McERLEAN: So I don't think we
currently have those incentives in place yet, but I'm
going to say that we don't have -- the ICC doesn't
have that. We do have that public general interest;
and there isn't anything in the Public Utilities Act
that prevents the ICC from taking that type of
approach, whether the public utilities need to be
more incentivised on the program they choose to
implement. And until we know the type of role that
the Illinois utilities want to play, it's really hard
COMMISSIONER ROSALES: We wouldn't have the funding available. Thank you.

MS. MEAGAN PAGELS: Thank you.

And, Christie, does the Commission have the authority to account for externalities, such as environmental effect of energy usage and set agency regulatory policy?

MS. CHRISTIE HICKS: Yeah. I think we've been hearing about that throughout the Next Grid process so far. There are certain programs where the locational and time value of various DRs coming online -- and EVs can become a part of this -- should be accounted for. So certainly the ICC has a role to play in incentivising appropriate charging and ensuring that it has the most beneficial impact possible on our climate; and considering the time and locational value of that is one way that they could do that.

MS. MEAGAN PAGELS: Sue, you discussed the impact of charging stations and how much they cost. For example, you brought up Charge Point and how it...
can cost 2 to $5. You know, how should we be doing this? Should we be having the hourly charging? Should we be having the at-home charging, hourly charging, and have that competition? What do you think is the right mix?

MS. SUSAN SATTER: We're at the beginning of the EV transition, but there are a few basic things that I think are important. One is you charge where you park. I think the 80 percent charging at home -- I think that's probably going to stay constant for a while. Should there be rate designs to incent charging for individuals at certain times? Sure.

Right now consumers can choose hourly pricing. There are risks associated with hourly prices. There's a level of knowledge of the grid and how the energy market works that's required if you're going to go on hourly pricing. You can do it and say whatever, you know, I'm just going to -- my bill will be manageable. But most people, if they're going to do that, understand what they're getting into it. So we have hourly pricing. We do not have time of use price for supplies. We only have hourly pricing for
supplies.

Then you have your delivery side. We do not have time of use for delivery. So even though your supply charges might be low at night, your delivery charge is the same. So what happens is, as you increase your demand, you're charging at night, on your bill you have this nice circle that shows you how much of the bill is for delivery, how much is for supply, how much is for taxes and fees. The delivery portion gets larger and larger and larger. It could be two to one now over your supply; and, partly, that's because of the hourly effect of supply.

So, you know, should that be changed? I don't know. I mean, today you have early adopters of buying EVs. These are people who probably do understand the market. They do understand how to program their car so that it will charge when the price is low. I mean, that's already embedded in the car. But these are early adopters; they know what to look for. I think we have to give it time before we start suggesting that rate payers pay for incentives for people -- for early adopters who are going to do
it anyway because they're interested. They have the money. They're earning more than the median, more than $60,000 a year. They can do this. I'd say don't expect to provide incentives to a utility to encourage growth when it's happening anyway. And the utilities are constantly dealing with growth.

CTA; how do we accommodate their charging? That's just normal. Do you need an incentive for them to do that? I would say not. I would be very, very careful when you start talking about incentives. Because what is an incentive? Okay. An incentive is giving somebody more money. So you have to know for what. Number one, for what; number two, who's paying; and, number three (inaudible).

COMMISSIONER ROSALES: Just for my edification or the other four people that happen to be here, how much does it cost you? You know your bill more than anybody else. Tell me. Do you kind of know? It should be fairly consistent. Although, you might take a trip or whatever, but shouldn't you kind of know what you pay?
MS. SUSAN SATTER: That's a great question.

Now, I do have one slide here, which is EV effect on residents. And you'll see that for, for example, January went up quite a bit. But in some way the whole chart doesn't make sense because it has my bill for January 2018; it was $21, and it has $10 a year before. So there's some problem with this data.

But I've been trying to look at that. And somehow the data that's available to me has made it difficult. I get about 2 miles per kilowatt. So with my kilowatt I already have to pay 10. So you have to run the math. But, ultimately, people if we get past the early adopters and we get to a mass market, then they'll want to be sure that it's a schedule that's cheaper.

COMMISSIONER ROSALES: So you said you get 2 miles per kilowatt?

MS. SUSAN SATTER: Kilowatt hour.

CHAIRMAN SHEAHAN: Meagan, can I ask a question?

Sue, I'm kind of curious as a consumer as to what your view is for what a TOU rate or what
that design would look like down the road. Right? I think everybody acknowledges today that this is not really a mature space. But, you know, there are a lot of estimates that, within the next 20 years, 15 or 20 percent of cars will be electric.

So I'm curious. What does it look like from your standpoint to kind of shift that? Right now everybody is going to go home and plug-in. You don't want to create a newbie, but if you spread it out overnight, assuming people have good information, they're all going to try to do the same thing at the same time. Right? It'll be 2:00 o'clock in the morning or 1:00 o'clock, et cetera.

MS. SUSAN SATTER: Well, first of all, today you can program your car. So when you buy it and you're trying to figure out what to do, assuming you have some price analysis, you can program your car to follow prices. You can do that already; or you can time it. So I have time to start, like, at night and go to sleep, because I know that that's the wise thing to do.

If you have a time of use rate, I
would say the most important thing in a time of use
rate is to keep it simple. It has to be simple. You
can't have peaks and shoulder peaks that then come
back up (phonetic). If it's anything but simple,
it's going to be a mess so that you'd want to have a
block that will follow the market. If the market
price -- the supply price starts to go down, say, at
9:00 o'clock at night, you want to start it at 9:00
o'clock. It has to be simple.

CHAIRMAN SHEAHAN: Would it just be for EVs?

MS. SUSAN SATTER: I don't see why you would
separate it out for any particular use. Because
think of air-conditioning; air-conditioning -- I see
air-conditioning -- the growth of air-conditioning
is --

The growth of EVs, it's a huge
additional new demand on the system. Right? And the
utilities are very happy for it. They became more
efficient over time. But when you run your
air-conditioner, do you precool at night? So that's
a whole nother big block of usage that would benefit
from a ton of use rate. So I would say don't limit
it to just electric vehicles. I don't see any real need to do that.

CHAIRMAN SHEAHAN: I want to dig into that just a little bit because I thought you were sort of admonishing us not to kind of shift the cost of, you know, this novelty to other people; but you seem to be suggesting that, at the moment.

I mean, if you're trying to avoid this sort of new peak at the end of day that EVs are going to create, or overnight, that's going to compete with doing the laundry or precooling your house or whatever it is, why would you want to have people pay more for that; or do you think that would necessary?

MS. SUSAN SATTER: Pay more for...?

CHAIRMAN SHEAHAN: I guess I'm assuming that if you roll it all in together, you're going to have more demand on the system; you're going to get higher costs overall; or do you think that won't happen?

MS. SUSAN SATTER: It depends. We don't know when the charging is taking place. If the charging, in fact, is taking place because of the early adopters or because of information provided by the
auto makers, if the charging at home is, in fact, taking place later off-peak, then you're not necessarily increasing the total demand on the system, right, the number of megawatts on the system, because you're using the quieter time in the middle of the night.

There has been a lot of talk in this space for quite some time about load shifting. Right? So that you shift your demand from that peak time in the afternoon, 6:00 o'clock, to later in the day or night. And EVs are just one -- I'm just cautioning against treating EVs necessarily as a separate unique application, because you have air-conditioning and you have other demands; and then, of course, you have -- if it's a charging station, is that commercially used? Do you have a completely a different rate design for a commercial charging station than you do for somebody at home? We don't know how it's going to shake out. But before we worry about the rate design or start to design something that might not correspond because we're anticipating the problem, I would caution a
little time gathering more and more data.
And what are our objectives? Are our objectives to clean the air? Are our objectives to increase kilowatt outage? Are our objectives to decrease kilowatt hour use?

CHAIRMAN SHEAHAN: Do you think it would be an appropriate subject for a pilot?

MS. SUSAN SATTER: I think it's early. And it all depends on what's being proposed. Time of use has been -- we've been talking about it for quite some time (inaudible). There could be unexpected results, which is of course kind of why you'd want to do a pilot.

MS. CHRISTIE HICKS: If I can jump in and respond to that point as well, certainly more data such as through a pilot program -- the more data, the better. EDF has been modeling some of the available customers usage data that we've been getting. And they anticipate that 10 percent of electric vehicle penetration could actually increase the residential peak by 40 percent. So there is certainly additional disproportionately impacts of -- or potential
disproportionately impacts of electrical vehicle charging. But what it also shows that if you could shift the majority of that charging until after midnight, you could actually reduce overall residential peaks. So I do think there might be issue to be made for treating electric vehicles different than other technology.

MS. JANE PARK: You know, I'll sort of add to that, at the end the day we're talking about efficient pricing. We just had a whole panel that's all devoted on how to optimize pricing and change the customer's behavior that way. You talk about time shift. I think another interesting -- we see BP (inaudible) and others asking the same question. Is the impact to the grid particularly concentrated or clustered in a particular location? So I'm not solving any problems here. I'm actually adding to the layer of complexity for a lot of states that deal with. And adoption is like a hockey stick. You know, you have clustering and heavy grid impact that's localized. And then what is it that you have to do? What sort of tools in your tool box do you
have to deploy? There are a number of things that we need to think through.

CHAIRMAN SHEAHAN: Can I ask a quick follow-up on that? So if you believe groups like BP or Bloomberg New Energy Finances they do predict something that looks like a hockey stick; and, you know, some stakeholders are advocating kind of outgoing slow, how much urgency is there? I'm interested in everyone's perspective on how much urgency there is in preparing for this.

MS. JANE PARK: I guess I would say at the end of the day this question of how fast -- how soon is probably one of the greatest questions that policy makers have to wrestle with because the policy makers, regulators, this is what you do on behalf of the State. From our perspective I would say that we are, from a grid perspective, trying to figure out how to manage the grid, how to get the grid ready for this type of uptake. We are looking at it seriously. It's something that we have to take seriously because if that hockey stick materializes just like if there's a security issue or if there is something
that happens, the magnitude could be so high and it impacts whatever response. So I would say from our perspective the impact of EVs, understanding from the customers' sentiment that they want EVs or are interested in EVs, trying to understand how EVs interact with solar, which is increasing rapidly in Illinois and what that impact is going to be, all of that makes it a pretty important issue for us as we think through it. I would evaluate the urgency beyond that other than to say it's an important issue that we directly correlate with everything from solar to storage to grid reliability to interconnection and every other major topic that we're wrestling with.

MS. SUSAN SATTER: It's never too early to look at something to consider it. But when you're at .1 percent penetration, I would say you have to be very open to what might come and open to market solutions that are not utility solutions, and try not to prejudge.

MS. CHRISTIE HICKS: I think the portfolio options that are available and the data that we've seen about the increase and uptake in electric
vehicles, the two of those things together do provide
a good basis for starting to pilot things now --
electric vehicle pilots, time of use rate pilots --
because we don't know what's going to work best for
Illinois; and that might not be the same thing that
works best for California, and for DC and, for
Hawaii.
So there's a great opportunity right
now, particularly at the Commission, in considering
how to value other forms of DER to consider these
issues together and to try to get the most
information that we can about what programs and
combination of programs are going to work best for
Illinois.

COMMISSIONER ROSALES: I appreciate Jane
singling out the fact that that's our responsibility
at the ICC. So thank you for pointing that out.
That's why we're asking for help. But there's a
number of ways from our Chairman -- and I know you
take it serious just like we do. We're in earnest
with you. There will be a number of coincidences
that would change the construct, the paradigm, pretty
quickly if gas all of a sudden goes to $6 a gallon. If car makers decide, We're only going to make it EVs, there will be incentives coming through from the legislature. All of a sudden this .82 rises dramatically. Would you be prepared for that?

MS. JANE PARKS: I believe that -- well, I believe that we would be prepared to some extent. It's all going to depend on how steep that penetration, like how quickly that comes into play. But we are working pretty hard on a whole host of things, focused on the grid and even hosting capacity information. You heard, for example, one of the other panelists talk about the importance of finding data and things like that. There are efforts that we have afoot that will help us I think to a quick transition. This is something that we are very seriously considering. And I think, you know, like with solar -- I mean, for example, the way it's written, you have 4 million regs by the end of 2030. If it was 4 million regs by 2018, that's an entirely different story. And I apologize. I didn't mean any offense, but I really genuinely think that at
least -- let me put it this way: Internally within ComEd this is something that we struggle with because you see a lot of market review here. And we ask ourselves is this a canary, a coal mine, or is it more? Is it real? We ask ourselves these all of the time about industry changing technology. And here you have EVs. Looking at the data we look at, looking at the trending we see across the nation, and just how other states are now starting to move increasingly towards that, it's something to take very serious.

Now, just yesterday Trump did announce that his administration is thinking of pulling out from the California emission standard. That could be a game changer. I don't know. That's exactly right. There is a bucket of uncertainty. I do think, with respect to EVs because of the way storage work closely with battery and the solar and how we're thinking about that (inaudible).

COMMISSIONER ROSALES: You do get a pass on that feature because it didn't begin until 2017.

MS. CHRISTIE HICKS: I would add to that that
we should plan ahead. There are costs to do, not many, as well as costs to being reactive. And we don't know exactly when EV penetration could disrupt the grid, if at all. But we should be ready so that when that does happen, we're not creating new system peaks and thus more costs to customers.

MS. MEAGAN PAGELS: I think we are out of time. We can take one question from the audience if anyone has a burning question.

(No response.)

MS. MEAGAN PAGELS: Great. I want to thank all of panelists for being here this morning. Thank you so much. We will now break for lunch.

(Whereupon, a recess was taken.)

COMMISSIONER PALIVOS: Welcome back. I hope you're all recharged. I would like to, again, thank our panelists from Panel 2 for sharing their insights and perspectives of the legal and regulatory framework for EVs in Illinois and other states. To lead our discussion for our final panel, I would like to introduce Katharine McErlean, Special Assistant to the Executive Director here at the ICC. Please join
me in welcoming Katharine.

(Appplause.)

MS. KATHARINE McERLEAN: Thank you,
Commissioner Palivos.

My name is Katharine McErlean, and
I'll be moderating Panel 3. The purpose of our panel
is to discuss best practice and trends in rate
structuring for accessibility. The format of the
panel will consist of brief presentations by each of
our panelists followed by a series of questions. And
if time remains, we'll take questions from the
audience.

Before we begin I would like to
introduce our panelists. First, you'll be hearing
from Erica Bowman, Director of Environmental Strategy
at Souther California Edison. Next you will hear
from Ryan Schonhoff, Rates & Analysis Manager at
Ameren. You will then hear from Dan Kolata,
Executive Director of the Citizens Utility Board.
And last, and apparently not least, you will hear
from Erika Meyers, Director of Research for Smart
Electric Power Lines. Please join me in welcoming
our panelists.

(Applause.)

MS. KATHARINE McERLEAN: Erica, you can begin when you're ready.

MS. ERICA BOWMAN: Thank you for having me. I'm going to start a little bit really focusing on California's experience. So I'm going to start, just to focus a little bit on California's experience, and then where we are, from Southern California Edison's perspective; and then kind of talk a little bit about kind of where we're heading with respect to rates and how we think about them as we move forward with EV infrastructure implementation and how do you get the utilization that you want to see on your distribution grid with this new load coming online and making certain that folks are charging their electric vehicles as efficiently as possible relative to where you'd like to offer your grid.

So one of the things that I think makes California unique is we have a very aggressive climate target, in terms much GHG reduction. So by 2030 we need a 40 percent reduction below 1990
levels. And by 2050 we're going to need it be on a trajectory to hit 80 percent reduction from 1990 levels. I think what's really important to note is that today with emission you look at where can we move. We've basically had emission flat from 2015 relative to 1990 (phonetic). But when you look at where the GHG emissions are coming from, you can see that there's still more to get out of the electric sector, but the biggest one is the transportation sector.

So right now we're at 39 percent of the transportation sector emitting GHG and then add another 50 percent buying the gasoline vehicles (phonetic); so you're getting almost half of our emissions today are coming from transportation. So in order to even meet a 2030 goal, we need to have a cross-sector approach to basically hitting those goals. That's why we're really focusing on transportation and electrifying that in California. Southern California produced a white paper (phonetic) where we laid out what our position is and how we think the states need to get there; and
there needs to be a lot of collaborative actions among the stakeholders to get there. But one of the things that I think is really important to note is that, in our assessment, we found that we needed to have 7 million vehicles in California on the road by 2030. Today we're at 320,000. So we need to increase our vehicle stock, our electric vehicle stock, 20 in less than 12 years. So it is a significant list just to get this to happen. There's a lot of policies going on that's trying to move the needle on this.

Just recently in January Governor Brown put out the state's target where they're saying that they want to hit 5 million vehicles in 2030. That's actually a little bit lower than where we thinking we needed to be in our own assessment, but we definitely think the states are moving in the right direction because, prior to that, it was 1-and-a-half million vehicles.

So, in addition to that, there's a goal of charging station deployment -- public charging station deployment of 250,000 charging ports
to supply our vehicles by 2025 to make certain you're helping to overcome some of the barriers that we see to vehicle adoption. This is a chart -- we've done a lot of work on how we address the barriers that folks are seeing. And I'm certain that others have covered is, but it is very different to be driving an electric vehicle that may have a hundred miles of range or 200 miles of range versus your internal combustion vehicle that can have 300 or 400 miles of range for the kind of vehicle you have.

But there are lot of barriers, too, that are really impacting whether or not folks are willing to adopt electric vehicles. One of the biggest that we're seeing that is actually rising to the top is just awareness in general. You still have a lot of folks not aware even in California. I mean, Californians are bit more aware than the national average, but we're still struggling on getting folks to be even be able to name one electric vehicle that's on the market. I think we're at maybe 50 percent that can do that. People don't even know they exist.
And then there's also issues around just performance and understanding what they can provide. There's a lot of things to overcome; but there's also barriers to site hosts, people willing to house EV chargers as well as manufacturers. So there's a lot of interdependencies going on and we need to figure out how to solve those.

And then from our perspective we have -- one of the things that the legislature -- back in 2015 they produced what we call an SDGE; and it really laid out different actions that ordered different regulators to make certain that the IOUs (phonetic) and other public utilities are addressing the need to make certain that, as much as possible, electric vehicles can be adopted by the public; and so we've been putting forth different applications to address this; and this is really focusing on the electric vehicle charging, so that's workplaces and our destination centers.

While we understand that going forward it's something that folks will continue to want to charge at home -- that's one of the kind of
conveniences of having an electric vehicle, that you're able to come home and plug in; but there's still a question of, when you're out driving, will you have the resources of fueling infrastructure to enable you to go distances if you want to. That's really where this away from home charging comes into play.

The other piece of this is California is unique, I think, relative to the rest of the country -- or at least the Southwest is unique in that our renewable resources are really forward (phonetic). We also have wind and thermal. But optimizing distribution, you really want to encourage charging during the daytime, which I think is a bit opposite of certainly in Illinois and other places where you have a lot of wind. At nighttime you may actually encourage folks to come home and charge more. Where in California we're thinking, Look, if we want to manage our grid and we want to minimize some of the -- in terms of that really big gap from when the sun starts setting and then you have all of this demand coming online because a lot of that
rooftop solar isn't producing anymore. Then you start having vehicles -- on top of that we need to start structuring our rates and structuring incentives in a way to get people to move from at least a little bit, either moving their charging to later in the evening, later at night, or moving it into the day so it can actually flow some of that solar generation.

Now, this is in conjunction with the fact that we're moving to 50 percent renewable by 2030 and from an SE's perspective we're actually thinking that we need to move to almost a 70 percent renewable portfolio in order to meet the 2030 target. So you can start seeing how it's really important to start structuring rates as well as figuring out how driver respond to this and what other mechanisms that we can use.

So one of the things that we've been examining is this long time of use rates, making certain that folks have different rates during different times of the day so they are encouraged to use electricity at different times so it's more
optimal for the grid. And there's also managed
charging that you have. You don't have to do it
through rates; you can also control your load through
the electric charger itself so that you could maybe
throttle up the amount of electricity going into the
vehicle so it's charge is faster, or you can throttle
it back down depending on where you are during the
day. These are other options that we have as we move
forward to think through what's the right combination
of these programs so that we're making certain that
we're maximizing our benefits to the grid as
additional loads. Thank you.

COMMISSIONER ROSALES: You said you have to go
up to 70 percent renewable to meet your goals?

ERICA BOWMAN: That is our -- yes, we believe
that we need to get up to around 70 percent
renewables and have vehicles about 80 percent
carbon-free, when you include nuclear, in 2030.

MR. RYAN SCHONHOFF: Good afternoon. And thank
you Katharine and Commissioner Palivos and the other
Commissioners for inviting Ameren Illinois to this
session. Today I'd like to talk about four main
First off, I'm here from Ameren Illinois, but I wanted to talk about the Ameren Missouri Charge Ahead Program, just to kick off. Then I also want to talk about some of the rate opportunities and rate structuring that some of the other panelists have talked about today. I want to dig in a little bit deeper on what the Illinois electric market looks like and what rate structures look like in Illinois; and opportunities -- looking at what to do to promote deployment of EV vehicles in the state.

So Ameren Missouri Charge Ahead Program is actually a pending program. They filed it in February 2018. It's actually three separate programs, three separate tariff filings. The first one is the electric vehicle charging infrastructure. It's been branded Charge Ahead Electric Vehicles. And what this is -- this kind of gets back to a lot of what the panelists have talked about, as far as barriers to the entry of other vehicles. The idea is you would get a solicited charging infrastructure or solicited charging ecosystem. That's really one of the big things that's inhibiting more electric
vehicles in the state of Illinois.

So the Charge Ahead Electric Vehicle Incentive Program targets business to provide incentives for workplace charging infrastructure. It provides incentive for public around town. It provides incentive for multi-family dwelling, apartment complexes. And there's also a portion of that which provides incentives for the long-distance support group (phonetic). Everyone talked about the Level 3 charges. And really what the community believes is that once that charging infrastructure is in place that a major barrier of consumers will be removed for purchasing electric vehicles; so that's just a big one.

I talked about the other two programs, Charge Ahead. One is the Business Solutions. This is really about efficient electrification. This provides incentive to convert traditional fossil fuel equipment to electric equipment such as forklifts and other material-handling, that type of thing. And then the third piece of that program is the Line Extension Program. It's not a huge program. It's
just a revision to the line extension policy that exists as a standalone tariff.

So what do all these three things have in common? They're really in place to increase utilization of the grid, which has many benefits. First and foremost it could lower rates for all customers, all none participants of these programs. We know it's not always all equal, but it should have effective lower rates.

There's also many benefits to the participants and incentives. With electric vehicle owners, they'll see lower fuel cost; or a Business Solution recipient would see lower fuel costs. Also customer choice is always a great thing. And, finally, just cleaner for the environment with local and global emissions.

So people have talked about this, opportunity for rate restructuring. On the left you see a graph of worst case scenario would happen and if everyone comes home at the same time and plugged in, you could see new peak demands on the system. We hope that doesn't happen. We hope the graph on the
right occurs, whether it be the incentivized
customers will charge during off-peak times where you
get higher utilization assets and you see those
benefits that we talk about, lower rates. So rate
design would take advantage of this would be
beneficial to both participants and nonparticipant.

So digging in a little bit to market
structure and rate structure in Illinois. Sorry if
you can't see the picture. On the right you're going
to see a picture of the Ameren Illinois bill; and
there's two pieces of that. There's the delivery
service and then the power supply. I think Sue
Satter pointed that out earlier today; but when we
look at the previous graph here, this isn't really
talking about kilowatt hour sales. When you spread
the -- when you increase the utilization of the grid,
you really increase sales, and you're lower costs.
So that really applies to the residential small
commercial sector demands of kilowatt hour charge.

Something to keep in mind when you're
talking about large C & I customers, who are on
demand charge -- not saying demand charges are bad --
but when you fill in the middle curve there, you might not see a lowering of rates due to many workplaces charging. You may see cell phone kilowatt hour, but you still have the same demands. You're not really increasing that.

And then I want to talk about the power supply choice. Ameren Illinois, like ComEd, is in a choice state deregulated. You'll see the column in the middle is called RTP supply option. We have about 10,000 customers on that. That's really a great time of use option for customers who are doing EV charging to incentivize charging at the off-peak nighttime for Ameren Illinois.

And then I want to point your attention to the last column that says RES; that's retail energy suppliers. What that shows is that a great majority of our power supply is procured -- or is supplied to customers by this third party. It's a free market. Ameren Illinois, like ComEd, controls what the price structure is for that segment.

And then, finally, how can Illinois promote efficient deployment of EVs. We can leverage
the AMI system, which is advanced meter infrastructure. I think we heard Jane Park talk about this. It's a great investment. It's a wealth of data. With this data we have hourly information, more advanced rate design than whatever possible before. And there's some other technology that I think people mentioned. There's some CATS (phonetic) and some other smart technology that maybe controlled as well.

So when we talk about the delivery service piece -- part that Ameren Illinois and the Commission more or else could mainly control a little more, alternative rate design on that could be time of use energy charge. So if that's something that's similar to what we have today for residential. KWH that's more of off-peak to off-peak; or it could be a demand -- it could be a demand charge, and off-peak to off-peak and demand. It could be a nighttime/daytime type of thing.

How could we encourage power supplies portionability effect? Really we have a good program, a lot of smart pricing for time of use. We
should encourage more EV owners go on that rate. And then this is a question to everyone here, How do you encourage RES to provide innovative pricing options? That might also encourage electric vehicle and other off-peak charging. And, finally, with just any kind of programs you've got to be aware of -- we need to make sure we have cost recovery at the utility level to help promote and get those programs off and running. That's all I have.

COMMISSIONER ROSALES: You know this is coming; right? You've got the Ameren Missouri Program here. Why do you not have the Ameren Illinois Charge Ahead Program?

MR. RYAN SCHONHOFF: Why don't we have an Ameren Illinois Charge Ahead Program? In Missouri -- well, let's just start off saying the rate structure in Missouri is different. So Missouri is a very integrated utility. They generate -- the way they finance is different. The mechanism will be different. I think we probably could have programs like that. I think they would have to be structured a lot differently. I'm not sure what those
structures would look like, but we need to make sure
that those programs could fit into an Illinois
business model.

COMMISSIONER ROSALES: Because we have an open
market in Illinois. We don't have the opportunity
for a program like this?

MR. RYAN SCHONHOFF: I think we have some
opportunities because we have the delivery service
portion of the bill where we could essentially incent
customers through rate design. I think we have less
flexibility, or less control, over the free market;
it's not just that Ameren Illinois can't -- and the
Commission I don't think can create rate structures
at the RES level, retail electric supplier level. So
when you're talking about half of your power supply
half distribution and delivery, there is less control
there to promote these types of things, but there
certainly is opportunity.

COMMISSIONER ROSALES: Am I making this up?

Why is it pending?

MR. RYAN SCHONHOFF: They filed it February
2018, so it's a very new program.
COMMISSIONER ROSALES: And this incentive -- on this incentive that you have, that's an incentive from Ameren itself, not from the State of Missouri.

MR. RYAN SCHONHOFF: It is from Ameren, yes.
There's a bunch of -- I think it's about $10 million dollars.

COMMISSIONER ROSALES: 11.

MR. RYAN SCHONHOFF: $11 million dollars.

MS. KATHARINE McERLEAN: Thank you, Commissioner Rosales.

Dave, you can go ahead when you're ready.

MR. DAVID KOLATA: Thank you, Chairman and Commissioners. My name is David Kolata. I'm the Executive Director of the Citizens Utility Board. I've come to share our perspective with you regarding consumer guides that've been published the ABCs of EVs. We're very proud of that, and I encourage you to check it out if you haven't already; but I'm going to summarize very quickly one key part of it.

So we started from the premise that transportation electrification has increased. And we
see there's estimates from Goldman Sachs, for
example, saying plus 22 percent market share by 2025
worldwide. From Eager Energy Finance (phonetic) it
is 54 percent of the car sales by 2040. There's a
lot of reasons for this. I think what convinced us
that this is something that we need to get ahead of
is really China. It's our understanding that there's
about as many cars in China right now as there here;
but now you're looking at they have 600 or 700
million to go. They really can't do that internal
combustion without possibly killing themselves with
pollution. And there's also with their export
development model (phonetic), they're pretty much all
in on trying to be the Detroit of the EV world. So
because of that you've really seen the manufacturers
worldwide double down, triple down on EVs. So I
think that there's a lot of momentum -- even though
it's at low levels now, there's a lot of momentum for
transportation electrification that creates both
opportunities for consumers and challenge.

It's pretty much in some ways the same
issue, which is basically design the system so that
people charge when it's best for the system and don't charge when it's not. And that requires proactive policy. It's something we need to get ahead of. We haven't really done that with any use of electricity. We should have through the years. So it's something that we believe the Commission needs to get ahead of. That's why we're very pleased to participate today and that you've started proceedings like this.

And, ultimately, the proactive policies need to start with consumer-focused principles. There are several of these that we go over in the ABCs on the EV guide, but probably the most important -- I would say it is the most important one -- is that ultimately charging patterns need to be optimized to improve load shape, to prevent peak demand increase to the extent that you can. There might be a little bit of peak demand increase when we get the cars on the road, but our goal should be to prevent that to integrate variable energy resources. Clearly, as you know, Illinois has made a commitment to move toward a carbon-free electric system which we think is a great move. But
as we get more variable resources on the system, it would be helpful to have something like an EV to help balance that out. And, ultimately, what you're trying to do here is maximum grid value. I agree with my previous panelists, basically, that that's kind of the key. The only thing I would add to it is that that could potentially change over time. So, in other words, right now it is the case that we want, basically, people to charge at night because of the negative price due to wind. You can imagine a scenario where we would want them to move that because you've moved everyone there and it creates off-peaks. So it has to be dynamic and flexible; but, ultimately, we want to make sure that the charging patterns are optimized for maximum grid value. And we think that's almost certainly the best way to do that, if not the only way, and any additional things that we do.

But at the end of the day price signals, smart rate, and design are essential. It's almost certainly the cheapest way to coordinate price signals. So one of our core things that we like to
see is the adoption of dynamic and time variant rates. We do have real-time pricing programs, which is fantastic; and one who has and EV on it (phonetic); but I think more can be done there. It's got to be more than just wholesale eventually because ultimately there are potentially some local grid impacts that we want to prevent on the transformer level that real-time pricing would be negative. But if you have cars charging at the exact same time, it might strain the distribution system and require expensive and needless upgrades to be socialized across the system. So you have to have a low congestion pricing rule, something along those lines.

The last thing here is -- I think there's a typo here. I should have said, "the perfect distributor energy resource". It says "a perfect distributor energy resource." And what I mean by that is cars aren't used very often. Most time people are parking, and EVs have batteries in them. I think it's -- you know, who knows how near term this is, but there's a lot of talk about automated vehicles which will almost certainly be
electric. And my view is that if a car can navigate the streets of Chicago or Naperville without a driver, it certainly would respond automatically to price signals. It's kind of insane if it couldn't. So there really is a lot of opportunity to manage it as an energy resource for the grid despite the fact that of course the main purpose of it is actually transportation. So we do see the opportunities here.

On the utility role here -- and I mean "utility" in a broad sense to include regulators and the public -- you know, ultimately, we do think that, as you get to scale and there are millions of cars and EVs on the road, it needs to be coordinated and it needs to be facilitative. It needs to be optimized. And, ultimately, the value is going to be maximized for all consumers, including those who don't drive. And I think this was a particularly important issue that even in the nature of energy technology, early adopters tend to be people who've got some resources; and you want to make sure that lower income folks or people who can't afford an EV right away aren't harmed. You also want to make sure
that in any program design that we come up with, that
there's an opportunity, be it ride sharing or public
transit and the electrification of that, so that all
classes of consumers can benefit. I do see a very
strong regulatory role there.

We have a few recommendations. The
real-time pricing program, as I mentioned before. We
think that it's time for a proof of concept on this.
And what I mean is that we have, I believe, between
ComEd and Ameren over 40,000 people on real-time
pricing right now. I know last I heard it elevated
to over a thousand of EV drivers who self-identified.
"Hey, I've got an EV, and I'm on this rate." I think
there's some interesting pilots that we can put
together -- not maybe a pilot because we have the
program. This is something Illinois uniquely has
that we can put something together that would
encourage people to be on this rate and then quantify
the impact -- that's what I mean by proof of
concept -- just to see how much switching response
there really is. So I think that's something that we
can do pretty quickly, and we'd like to see that.
I do think that TOU is an important step. I do think that the utilities can offer that and that the Commissions can order people to do it; bus to see if a time of use price may be more attractive to some people and maybe it accomplishes pretty much what an RTP would. So anything you can do for time variant options I think is good.

In general, we want to see a fair number of cost benefit analyses as we get into the questions about, What is the utility going to do and what is the State going to do? We'll be investing in all of those questions. It can be very important to really quantify this and make sure that ultimately the benefits and costs -- I know we are planning on doing some of this, which you can do by paper. You can do math and make certain assumptions. But I think especially, to the extent we can tie in pilots and tie in things that are actually going on, because ultimately we want to make sure that whatever happens is as cost-effective as possible.

I, ultimately, think this will view, like a lot of things going in the utility space right
now, kind of pushes you in the direction of performance or outcome-based approaches. You know, putting it in a nutshell, I'd rather set up financial incentives for utilities to make sure that the benefits of transportation electrification for consumers materialized than charging a rate base bunch of charging stations. So I do think that performance-based approaches is something that we should consider.

And then, lastly, just an observation, not so much here but nationally, I do think there's sort of been too much attention on the who owes what question in this debate. Not that that's not an important question. It is an important question. It's secondary, or tertiary, in our minds. It's really not a question on guaranteed benefits. When these discussions happen, inevitably someone says, "Don't worry about it. This can work because cars are going to respond." Well, cars can respond. They should respond. That doesn't mean that they will. And if there's one point that I want to make and leave with you is that. Let's make sure that this
develops in a way that will benefit everyone.

And then for more information there's a link to our ABCs of EVs guide. I also want to mention, because I do think that this is important, there may actually be -- and I'm struck by the fact that so far we're all kind of saying the same thing. Erica, I know that you said something similar. There maybe more consensus out there than people think. EVaccord, which is a set of 11 principles that have a variety of labor and consumer environmental and utility groups coming around it. It doesn't mean that everyone agrees, but I do think there may be some common ground here, and I think we can work something out that will be a win-win for everyone.

Thank you.

MS. ERIKA MYERS: I'm in the position of being the last speaker of all the panels that have gone before me; so I will try my best not to replicate too much of what has already been discussed.

I'm very happy to be here. Thank you so much for inviting me. I really appreciate the opportunity to teach you all about electric vehicles
and as it relates to utilities. And I want to first
tell you a little bit about SEPA. We're based out of
Washington, D.C. We're a 501-C3 (phonetic) education
nonprofit. We work with utilities and other
stakeholders on integrating clean energy through a
variety of different means, but education research
standard and corroborate are key elements.

I am a research instructor, so I will
highlight the research that's relevant to my
presentation today. I want to support the basis on a
new report that we just got in a few weeks called
Evolving to Unlock Grid Value. It's a new report
that focuses on the results of about 500 different
utilities, EV programs around the country through a
survey we conducted last fall; and that should yield
some real interesting insight for you today. I also
wanted to mention a report we published last year
called the Case for Managed Charging, which provided
a little bit more deep dive into exactly what managed
charging is and how it might be useful for you to
consider any policies and regulations related to
that. I also wanted to mention real quick another
one of our initiatives called 51st State (phonetic). This is our advocacy platform for 51 states. It was conducted on the idea of a blank slate. A new slate that does not exist that doesn't have any regulation for infrastructure; how would you design a new grid based on what we have today, the technology? And then based on those kinds of high-level thoughts, coming together on maybe some common principles or low-hanging fruit that we can start from, especially around more conditioned issues and DERs and how the utility's role is within that landscape.

We published a series of reports called the prospective series. You may be familiar with the one that we did with Illinois last year called EVRs Are Coming and Illinois Is Ready For Them, really highlighting a lot of the grid modernization that you guys have done today, and really a model for a lot of other states around the country.

Finally, we're about to release a new tool kit coming out this summer that allows regulators around the country to start implementing
some these low-hanging fruit through a series of workshops, facilitation, and other key documents that are of interest.

So we already talked a lot about how EVs are an asset to the grid. I just wanted to highlight the capabilities set here in the box as battery storage, interruptible load, and direct load control. You can see from that these green circles are the optimal opportunities here for EVs. It's a little bit hard to read, but hopefully in the printout that you have you can see that really, in the battery storage context, EVs are very well-suited for a variety of different capacities and ancillary services. Mostly what happened in the scenario where the grid eventually becomes reality; but certainly right now we have the capability with the last two with interruptible load and direct load control. And that's really where we see a lot of the benefits, primarily, from load quality and balance.

This is a visual of what exactly managed charging would look like. As you can see, in the light blue, this is what a time of use scenario
could potentially be, keeping charging relatively low throughout the course of the day.

The managed charging scenario here is where you can potentially implement workplace charging and home charging that follows solar peak and wind spike. In this scenario where you would activate charging or provide some sort of pricing that would allow EV owners to charge in more optimal windows, potentially getting into the negative pricing opportunities here in Illinois.

One scenario that we published last year is Sacramento (phonetic) utility district in California was, based on the EVs for passengers, and 250,000 vehicles in the service territory by 2030, they estimated, roughly, 17 percent of their transformers would need to be replace or upgraded as a result of unmanaged charging in their service territory. You can see the red is really where the majority of those replacements would need to take place, leading to a cost of 50 to $100 million dollars. The primary solutions set for managing this impact would be through charging. And they actually
COMMISSIONER ROSALES: Where is that?

MS. ERIKA MYERS: Sacramento.

And they actually have the time of use rate today. Unfortunately, only about 30 percent of EV owners in their service territory actually are on the rate. And of that they do have a fairly good usage of the rate of the 30 percent, but they identify the time of use is not the only option for them.

There is a very good opportunity right now to install equipment today that's incapable of being used. As you can see from this forecast from the EEI that came out last July, they're expecting a tenfold need in charging infrastructure from where we are today. As you can see, the majority of that installation would be within the workplace and the home charging area, with the light blue being public chargers. This is an opportunity that may not exist in a few years. Really the opportunity is now to install these ports with the kind of equipment that are capable of being managed. We did a survey last
year. Only about a third of charging equipment vendors offer a rate set. We are in the process of updating that as we speak; and, unfortunately, we haven't seen much movement in the industry to install the capability set. So really I think a lot of this will be on regulators and utilities to help drive those changes in the market.

So I wanted to quickly mention the report that I was talking about earlier, we set up a scenario here where we have three different stages for utilities. We have the early stage and intermediate and late stage as it relates to smart grid transformation where you would have a utility kind of get their feet wet, so to speak, with activity within their own utilities for things like workplace charging or EV fleet investment; also things like EV information on the web sites; intermediate stage, things like incentives for their customers to install structure all the way to time constraints. So really late stage is where we see the best opportunities for grid integration of EVs through things like managed charging.
Based on our survey, nearly 500 utilities -- the preponderance of the utilities are in the early stages; roughly, two-thirds. The other 112 are, roughly, one-third was intermediate and then we had 15 utilities that we classified as late stage. This is a breakdown of how it looks across different utility types. Here in Illinois we found two in early stage and one in intermediate stage. This is a breakdown of the activity type by stage. As you can see in the dark at the top is the most common EV information on our web site, but we only found one-third of the utilities had actually done that at the time of the survey.

Utilities lead the investments for the second most common, followed by workplace charging. And then you can see, going on down, it seems to decline by the level of involvement. The Illinois utility activities we found one had EV information, two with workplace charging, two with EV fleet investments and one with public place charging. We also did a similar exercise surveying, roughly, 70 different dockets around the country related to EV
between 2010 to 2017. Of course you see a continued
growth here of related docket year over year. We've
broken that down into the early set of 12 activities
I mentioned before. The most common that we found
within the docket is with EV-specific rates, followed
by public charging, and then residential charging,
and customer engagement. So those appear all in the
intermediate stage showing very little investment.

So just quickly, this is a map of
where most of those docket were. There's actually
quite a few here in the Midwest; and of course in
California being the most docket. So the Way
Forward is number one utility to develop a robust EV
strategy that works best for them in their service
territory. But also another important point is
building consensus role transportation
electrification and charging deployment; also
mitigating EV grid. And then what's listed up here
the panel mentioned earlier as well.

So I'm happy to take any additional
questions. I know that was a lot of data I just
threw at you, so I apologize.
MS. KATHARINE McERLEAN: On behalf of the Commission, I'd like to thank the presenters for educating us on best practice and the new trends for rate structure and program efficiency. We will now move into the question-and-answer portion of the panel. I will pose a question to the entire panel and anyone feel free to respond. And then if we have time, we'll take some questions from the audience.

So for our first question, just from your perspective, I just wanted to dive a little deeper into what are some of best practices utilities can use to incentivize customers to charge at correct times to assist with quick demand and grid overload issue?

MS. ERIKA MYERS: So we have a pilot program that conducted workplace as well as sleep charging; and the pilot itself was to do 1500 charges points within 2 years. We're just now completing that pilot. One of the tensions that we had when we were kind of developing it was allowing the business, the site hosts, our customers, to have choices in how they priced the charging at their site. So that was
one thing at least in our pilot we said, Okay, we're going to allow them to choose the pricing. They do have time of use rates. They also have demand charges and they can choose to pass that on to the customers, or they could choose not to and charge something different or have free charging.

But we did require them to participate in a demand respond pilot. And in that pilot one of the prerequisites was that if there's a traditional kind of demand respond, if you have a lot of peak energy happening and you initiate a signal. So we're often saying it's a little bit different on how to also do something where we're encouraging load shifting. And so this is something that we're just now rolling out, and we're looking forward to seeing what that data actually shows.

One other point is -- one other requirement within pilot was that site hosts participate in the program. They had to choose electric charging stations that were capable of passing time of use pricing to the drivers.

MS. KATHARINE McERLEAN: What does the EV
customers want? How do we motivate customers to change their behavior to charge in off-peak times? Are there other mechanisms besides rates and price mechanisms? We want to talk about behavior consumer behavior.

MS. ERIKA MYERS: I'll take the first stab at that. And I would say it is very difficult to know exactly what the consumer wants because we're working with a very small set of EV owner to date, most of which are early adopters and who are willing to make changes based on the shortage of charging infrastructure to date. So I wouldn't say exactly the population we should depend on for future decision-making purposes. We do know that there's a lot of work that needs to be done. The biggest question in my mind is, Will owners continue to use load charging, or are they going to demand fast-charging, something like a gas station model, in the future? That's a huge question in my mind, especially as we start seeing a new type of charger coming out that's upwards of 350 kilowatts that would charge their car completely in 5 minutes or less.
That capability might be more of a demand than a charger at home. And open up a market to individuals that don't have a broad or driveway today.

MR. DAVID KOLATA: One thing I would add to that is that I do think that this is a good opportunity to be here for just general education. I have gone into a few EV dealers -- Tesla dealers. I didn't buy a Tesla, but I wish I could. And I just asked, "Hey, do you know about real time pricing?"; and no one does. And so I've been trying to spread the word a little bit on that.

If you're in Illinois and you have an EV and you're not on real-time pricing, you are missing out on, essentially, free fuel. I mean, that's a pretty good message. I think we should do more to spread that. Ultimately, our view is that all of this should -- whether it goes through the charger or whether it goes through the car, what we're ultimately talking about is responding to pricing signals. And then if we need something we need to look into, especially if I think if it's an empirical question, I know a lot of companies want to
be priced -- so maybe Walgreens wants to give free charging to attract people there -- I think that that's an interesting question. Part of me thinks that as long as someone is paying the actual price, should I care? Probably not, but I do agree that somewhere in there if you get to scale, there's an empirical question about, What does that mean for the grid? But, ultimately, the more you can automate this, upon the education that other options are out there.

MS. ERICA BOWMAN: I just want to add a little bit to that. Right now should we actually be saying -- saying at least a version of time of use -- maybe not the exact rate that we're showing the customer. Maybe you have free charging at certain points in time, and you charge a little bit at other times. So that encourages charging on the grid where you want it to be.

I think the other piece, too, is we are very early in this market. And I think there's been a lot of questions that are coming up. And one of the things that I get a little worried about is
when we start kind thinking a little more deeper
about these things -- you know, not to put the cart
before the horse; but we're trying to get people in
EVs. We're still trying to get people to adopt
vehicles so that they can charge. Where right now --
sometimes I think we're a little bit further down;
like, What are all of these issues that we need to
sole today, we as opposed to we need people in the
vehicle. So those are other things that, given where
we are, we need to think through that. It's need sot
be more of -- we do need to progress in a way that
encourages adoption as well a thinking through some
of these grid management issues when it counts.

MS. KATHARINE McERLEAN: Thank you.

COMMISSIONER ROSALES: The high-speed option is
going to be a game changer in a lot of ways. Then
you're going to have the opportunity to extend those
trips that you had that you didn't have before.
You'll have all night to get your car charged.

So if that was indeed the case, would
the obstacle be the amount of load that's on the
grid? Is that going to be number one? I would think
so.

MR. RYAN SCHONHOFF: Kate from CTA mentioned that they have that -- site hosts have that capability. I think that's a main issue; fast-chargers will be ready (inaudible), which you may or may not have capacity, locations, which could add balance to the system.

COMMISSIONER ROSALES: I just think you've got the I-phone version where -- or some people have the android -- but you're charging them real fast, if it takes them a few rears to catch on. You know, the technology.

MS. ERIKA MYERS: There still is going to be a premium for that EV fast charger because of the load (inaudible) and what that does to the grid expenses. And so I do think there is going to be an incentive to be at long location (phonetic) if you have the time. Because the rate or the prior structure that you see there are going to be more in line with rates that you see at home.

COMMISSIONER ROSALES: But I don't think there's anything we see now on the market for
internet access. That fast charger was never really an opportunity. And now that it is, you know, that really changes the game in a number of ways.

MS. ERICA BOWMAN: Yes. I just want to make that it's not saying that long charging (phonetic) would be obsolete. It's just more options out there.

MS. ERIKA MYERS: I just want to add, as an EV owner myself, I'm used to paying a lot of money for gas. So, you know, the way that I perceive refueling is not necessarily the same as I see my electric bill. I see it as a replacement to my gasoline bill. And so you're not as sensitive to that price signal if you go straight from gasoline to DR (phonetic).

COMMISSIONER ROSALES: I just think we're in a world -- you think about how when you first got internet or your phone, how long that took -- remember the guy who threw his computer out of the window because he couldn't download; and you see how it's different. And so I see that -- I really see the slower part of that just going away once we become more -- with more and more technology. But really it's happening, and I really appreciate it.
Thank you.

MS. KATHARINE McERLEAN: Continuing to build on grid demand and managing the electric vehicle load, there is a thought that electric vehicles could potentially be used as a network of battery. Can you speak to how this mechanism could be used for energy storage and to promote energy efficiency?

MS. ERICA BOWMAN: We participated in a pilot in California, in the air force base territory (phonetic). I do know that part of it was providing vehicle to grid services. So, basically, the vehicle was being discharged -- the battery itself was being discharged to the grid; and they were working with Keisler (phonetic) our system in California.

Unfortunately, the results of that particular program was not as -- it was not very economical where they were anticipating that the cars themselves would have I think maybe like 5,000 per year value to them ended up being around 11,000 per vehicle cost. So there's a lot there that needs to be worked out. I think one of the things that we still need to figure out is not just vehicle to grid
application, but just vehicle to grid integration. And really first kind of vehicle -- it's really about managing the load that we've been talking about here today. I think the vehicle to grid application itself, we still need more pilots really to think through, but there's so much work in just managing the load itself as opposed to actually getting energy back onto the system; but right now that's where we should be focusing most of our efforts.

MR. DAVID KOLATA: Yeah, I agree with that. And just a quick observation. I don't know if it's totally true, but my perception is kind of that we can get most of what we need with just this first level, at the end of the day, that charges the cars. Thing would be easier if we could do vehicle to grid as well, but we don't need to wait for that. There's a lot of issue to think through on vehicle to grid, not the least of which the auto manufacturers don't provide because of warrantees of batteries and things like that. So it's an important subject and we should definitely move in that direction, but I don't think we should wait or that. I think we can do most
of what we need to do without it.

MS. KATHARINE McERLEAN: How do you bring electrification economy to all customers, low income communities and communities that don't choose car ownership? What do the models look like, and what could be unique to Illinois?

MS. ERIKA MYERS: I think this is a great time to also bring up the concept of share autonomous electric vehicles, or you can just share electric vehicles. So many of you are probably familiar with ride or car share services that use, especially urban quarters like this one -- it's starting to grow quite rapidly in the Metropolitan areas. And almost every car sharing service has made a commitment to putting more electric vehicles within their communities. GMC (phonetic) made a commitment that by 2019 they will have shared vehicles. So I do think that that is one of those potentially hockey stick things that we keep talking about that's really going to drive the market. Some groups are very on vocal-ish on that. They predict in 10 years, after autonomous vehicles will become regulatory, appearing across the country,
that 90 percent of all rides will be SAEV.

CHAIRMAN SHEAHAN: I'm wondering what each your opinions would be in terms of outlining a bold agenda for Illinois. If you want to position Illinois as a national leader in the promotion of EVs, what are the top two or three things you would have to do today?

MS. ERIKA MYERS: Number one, I think continue what you've done today -- or started today with this dialogue with the different consumer organizations across the country and here an Illinois to get their perspectives. I realize that there's not that many EVs yet in Illinois, but you guys have really done a great job in laying the ground work to enable a market here through the work that you've done in modernization today. Some of the investments you've gone done with AMI, you know, that's a great opportunity that I think a lot of people have really leveraged for things like DER integration and particularly EVs. So continue on with these kind of discussions and forums. I think this is a great start.

Number two, I would suggest continuing
to investigate things like managed charging. I know that it's somewhat far afield at this stage. There's a lot of steps that need to take place before you get to that point, but a lot of the industry I think can be largely played by early decision by regulators like yourself that are making a bold commitment to this technology and saying, "We we're going to have public charging, it should have this and here's why and here's where we think it benefits Illinois." I think that would help in a lot of ways in the industry. And then, third, standards and interoperability (phonetic) being a big part of that. There's not a lot of discussion at this point about interoperability, but it is a huge barrier to charging when you have a lot of disparate systems that don't talk to each other; and if they don't communicate properly, the aggregation is basically impossible. So a commitment by regulators such as yourself to tease out what are those opportunities could be very usable for the industry.

COMMISSIONER ROSALES: Just clarify interoperability.
MS. ERIKA MYERS: Yes. Let me just demonstrate what I'm talking about. So this a figure that came out of the Cases For Manager Charging Report (phonetic) I mentioned earlier. What you see on the left side is the aggregation point through messaging and aggregation protocols. There are a litany of different ways that you can eventually modulate that charge for the electric vehicle. Each of these may have its own standard and process that does not speak to the other. So it is critical that early on that these messaging and application protocols become standardize so that it could be can be incorporated in to the grid program.

MR. DAVID KOLATA: That's the second thing I would I add, support of the interoperability access. Ultimately, we want to leverage the network that we already have. And, you know, when you're driving across the country, you want it to be seamless. Interoperability access will help with that. I would say, Chairman, to build on your question, Illinois is the only state, as you know, for real-time pricing. I think that's
something we could put together pretty quickly to
take advantage of that and really show the benefit of
the program and how do people respond; and, if that
were to scale, what would that mean to the system.
It's currently something that no one else is doing.
California is doing a lot. They have a lot of
pilots, the rebates (phonetic). But, you know, we're
going to learn a lot from that. Right? Real-time
pricing is something --

MR. CHAIRMAN SHEAHAN: When can you file that?
Let's get folks together.

MR. DAVID KOLATA: I think that would be
fantastic.

MR. RYAN SCHONHOFF: I would agree with both of
those, too. Ameren Missouri, they're a little ahead
of the electric vehicle deployment process. Really
it's a holistic charging infrastructure.
(Inaudible.) It's actually multiple utility and that
type of thing. So getting that very high level
holistic charging infrastructure in line, I think we
can kind of figure out who pays, who deploys, who
owns, who charges, that type of things. The rate
designs and the incentive cost effective incentives really only happen after the fact. I think that probably the biggest barrier to people buying EVs are the cost; but I think that's coming down.

MS. ERICA BOWMAN: I am going to go a little different path. I agree with all of you on this. But you need get the vehicles out there. If you want to be a leader, then you need to get people in the vehicles themselves. I think two of the things that utilities can address on their own is the cost parity issue right. EVs are still more expensive. And so if you want more people in EVs today, you need to have some kind of vehicle incentive to get them there.

The other piece on that is education. There's a real lack of education of consumers on electric vehicles; cost savings on general maintenance as well as performance itself. And I really encourage that there be a lot more education outreach as well as marketing awareness to get the consumers familiar with the product.

COMMISSIONER ROSALES: I'll have to push back
on that because of Illinois -- people are based in the Metropolitan area, from Chicago to up to the state line. So I do understand we need to get the vehicles out there, but you need to place to plug them in. If we're talking about that in urban and other environments where seven-eighths of the state have the space but you have one-eighth of the state that have 8 million population, it becomes very difficult. We're not talking about apartments. We're talking about living in Wrigleyville. It's really hard to find a parking space let alone a place where you can actually charge in. It's not going to work if you're going to use extension cords to get over to your car. It has to be a two-prong.

MS. ERICA BOWMAN: Absolutely. I am absolutely in agreement with that. You need to get the infrastructure out there. But if you only get the infrastructure out there, that doesn't mean people will adopt vehicles. I think there needs to be a coordinated approach for all of these things together; the range anxiety, cost to the consumer, and the awareness.
MR. DAVE KOLATA: One area that you may -- the ICC may be able to explain the building codes going forward with new construction -- I know there's a lot of large buildings downtown -- is by looking -- call us and saying, "Hey what can we do to get charging stations to our residents?"; and it turns out to be very, very expensive to do it because, essentially, you have to go and rewire the whole building, which is cost prohibit. It's my understanding from talking to some folks in the union and others that with new construction, if it was just set up right, it would be virtually no cost at all. So there's a building coat aspect to this that, with some leadership, we might be able to at least help with this going forward.

COMMISSIONER ROSALES: I'm not sure where the cost is coming from other than not understanding who's going to pay that.

MR. DAVE KOLATA: This will be Level 2.

COMMISSIONER ROSALES: Okay.

MS. KATHARINE McERLEAN: I think this will be our last question, and then we'll take some questions
from the audience. I was just wondering how do you think regulators can future-proof EV policy given current changes to technology such as autonomous, electric, and shared vehicles in the coming year? What do we need to do so stay abreast of this current and vast moving changes?

MR. ERIKA MYERS: I have the same question. So SEPA hosted a meeting a few weeks ago in our office in DC where we invited all the autonomous vehicle experts that we knew in the area to come to our offices and have that conversation. There were utility members who said, How real is this? Are autonomous going to be electric? It's a big question. And what sort of charging are they going to use if they are electric? And there was a consensus in the room. You know FedEx, and the Time Jewelry Group (phonetic), and government agencies and the people who are researching on this every single day; and, unanimously, they said they will be electric, and they will be fast-chargers that they will be using; and this will happen sooner than anyone thinks.
So that really got my attention, and really we're looking into what that implication would be for the electric utility because it could happen very, very quickly.

MR. DAVE KOLATA: I think the most important thing is to focus on the policies and ensuring that we're flexible and always putting the grid maximization and the optimization question first. Get that right. Too much of this discussion does focus on utility ownership. A portion of that onus is on investments in infrastructure. However, there are high risks of strand cost (phonetic), given how uncertain things are at this moment. So I really think that we focus on the optimization question and setting things up so that however it develops we know fundamentally the consumer and all consumers are going to be put at center. I think we have a little bit of time to worry about some of the other questions, especially since we've started seeing pilots roll in. And then we can see what directions various states do on transportation laws. Certainly a big driver in California and West Cost states is
that they've got very aggressive transportation laws that say you must do that. If that's a policy
decision that the state of Illinois makes, then maybe infrastructure -- there's a lot of policy questions.
There's a lot of optimization questions. Let's focus on that and get that right.

COMMISSIONER ROSALES: Easy.

MR. RYAN SCHONHOFF: I think you want to study this very carefully and you want to identify those things that you can do and are very sure -- or probably sure are going to be around and not be just a trend and go for those things, incentives for those, and see what happens and then address it.

COMMISSIONER ROSALES: If you were here earlier, we made it clear in our Next Grid Program -- I mean, without giving the answers from October -- it's pretty clear that it's going to be around. So you could take that. We understand that.

How we go about that is where you all come if, and that's why we're here today. Really we need to get our head around it and understand how it affects us from A to Z. But it's coming. We know
it's coming. We're trying to come up with the type of policy questions that are going to at least put us in the right direction. There's nothing a hundred percent; but EVs are a hundred percent. That's where we're going. But from there, how we go, when do we get there, and how much resource do we use to get to the places.

MR. RYAN SCHONHOFF: We know where it's going. We know at this stage time and cost and benefits are parallel. I would agree with that.

MS. ERICA BOWMAN: So it is certainly something that we've been struggling with in California. There's a lot of change in the market today. How do we -- cars are going to be evolving. I see a lot happening. So one of the things that at least I know that we have struggled with as a utility, I think, across the state of California is that we've often been asked to pilot things first, go through a small -- which makes a lot of sense; and then you go on to a bigger program. The problem is that that the timing of that -- the time it takes to pilot, review the results, go in with another application, and then
move forward is just, I think, missing the mark in
terms of being able to change with the trends because
that's what we're changing. So one of the
recommendations I would add is that at least the
policy makers and regulators allow for timing, allow
for there to be evolution within whatever the
applications are, so that that technology trend can
be accounted for and changed.

It's hard especially when you want to
make certain that you're being mindful about the
consumer dollars that are going into it. But I think
if you're allowing for that flexibility, I believe
over a certain period of time it helps in making
certain that the utilities are actually matching
those up. I think maybe have certain milestones.
Maybe there's a 5-year. I don't know, obviously,
Illinois regulation work and the process itself. But
I know in California we can go in with a 5-year
program and maybe have milestones within that 5-year
program we have after Year 1, after Year 2, after
Year 4, what does the market look like? Can we do
that with the application so that then we don't waste
another 24 months changing course because we got it wrong because of the technology trend.

COMMISSIONER PALIVOS: Thank you. I think that is all of the time that we have for the panel right now. Can we please give our panelists a round of applause.

(Applause.)

COMMISSIONER PALIVOS: So on behalf of the Commission I want to thank you all for taking the time to join us at this Policy Session on Electric Vehicles Next Grid Stabilization. We have been very fortunate to hear from the experts both on how it's done in and around Illinois and in other states with successful electric vehicles programs.

I think it's safe to say that we learned a lot in a very short amount of time. I truly feel that events like these at the Commission are critical. It's important to me that we continue to educate each other and be catalysts for change in this industry, which has been considered slow to adapt to innovation and technology.

I ask that as we leave here today we
continue to think about ways to create a more stable and reliable electric grid and how we can encourage and intensify the electrification process and consider electric vehicles as part of the puzzle.

Thank you again for joining us today. I hope that you enjoyed this as much as I did. Thank you.

(Whereupon, the above-entitled matter adjourned.)