

STATE OF ILLINOIS  
ILLINOIS COMMERCE COMMISSION

EVS: THE BENEFICIAL ELECTRIFICATION OF TRANSPORTATION

POLICY SESSION

Wednesday, January 8, 2020, at 1:00 p.m.

PRESENT:

CARRIE ZALEWSKI, Chairman

BRIEN J. SHEAHAN, Commissioner

D. ETHAN KIMBREL, Commissioner

SADZI M. OLIVA, Commissioner

MARIA S. BOCANEGRA, Commissioner

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1           CHAIRMAN ZALEWSKI: Good afternoon. Welcome. Pursuant  
2 to the Illinois Open Meetings Act, I call to order the Illinois  
3 Commerce Commission's first Policy Session of 2020, EVs, the  
4 Beneficial Electrification of Transportation. With me here in  
5 Chicago are Commissioners Oliva, Kimbrel, Bocanegra, and Sheahan,  
6 so we have a quorum.

7           Our guests and panelists should be aware that  
8 a court reporter is present and that a transcript of the  
9 session will be posted on the Commission's web site.

10           I'd like to thank every one today. I'd like  
11 to thank all of the presenters today for their efforts and for  
12 putting in all of the hard work. We're very excited to hear  
13 all of this very important information.

14           I'd also like to thank Commissioner Bocanegra  
15 and her advisors who put a lot of hard work into it. And I'm  
16 excited to hear the robust discussion. The Electrification  
17 Transportation System is a timely and important issue. I think  
18 you all agree by looking at the size of the audience. So we  
19 look forward to hearing what our experts have to say.

20           Because of that robust agenda, I'm going to go  
21 ahead and just turn it over to Commissioner Bocanegra.

22           COMMISSIONER BOCANEGRA: Good afternoon, everybody.

1 Thank you for your patience. I know we are at capacity, which  
2 we were expected to be, so we are excited about that.

3 Thank you, Chair Zalewski and to my fellow  
4 Commissioners, my advisors, and our staff for helping and  
5 continuing to support this endeavor. We are excited to present  
6 to you guys the first Policy Session of 2020 here at the ICC.

7 A couple of things that I wanted to share with  
8 you guys. We set out to plan this; and in a lot of our  
9 research we felt that two things became abundantly clear. The  
10 first is that the discussion around EVs and electrification has  
11 moved so far beyond the stereotypical someone driving around in  
12 a really expensive EV and driving it only back and forth to  
13 their house. What we're seeing is a more holistic conversation  
14 taking place at all levels around a variety of topics.

15 Some of those topics include low income,  
16 carbon reduction, deployment and integration, workforce  
17 development issues, interagency planning, fleet transitions,  
18 right to charge laws, and even regional coordinations, to name  
19 a few things that we've seen.

20 The second thing that we are seeing is a  
21 massive growth in our sister Commissions addressing this very  
22 holistic conversation. We can now point to workshops,

1 conferences, and filings being held in some of our sister  
2 Commissions, like Wisconsin, Maryland. Washington stands out  
3 as a great example. Florida; Missouri. I could go on.

4           At last count, I think my team researched  
5 something like 35 states and around 133-plus filings; and  
6 that's all since the last time former Commissioner Palivos had  
7 a similar discussion. So we're happy to share that with you.

8           And I want to point out that a lot of those  
9 Commissions are addressing these very issues in a variety of  
10 ways, and some of them include -- or through these workshops,  
11 and/or through these inquiries, and through these filings --  
12 things like education and awareness; party emissions; low  
13 income, time of use; time of day; subscriptions; flat rates;  
14 some metering; commercial charging; rebates, just to name a few  
15 of the filings and conferences taking place around these timely  
16 topics.

17           So today we put together a variety of those  
18 industry perspectives so that you guys can capture what's going  
19 on nationally and how that conversation might fit in,  
20 appropriately, here in Illinois.

21           So with that said, I'm happy to introduce our  
22 first set of speakers. With us we have Britta Gross. She's

1 the Managing Director for Mobility at Rocky Mountain Institute.  
2 Second, we have Daniel Bowermaster, Electric Program Manager  
3 for Electric Transportation at EPRI. And, last but not least,  
4 we have Nick Nigro. He's the founder of Atlas Public Policy  
5 and Senior Advisor to Alliance for Transportation.

6 So with that said, we will get started, and  
7 I'll hand it over to Ms. Gross.

8 MS. BRITTA GROSS: Thank you. Thank you very much,  
9 Commissioner.

10 I spent a lot of my career at General Motors  
11 and recently left to join Rocky Mountain to work on  
12 electrification both hydrogen vehicles and also on hydrogen  
13 electrical vehicles. So let me try -- as a kick-off speaker  
14 here, let me try to just paint the landscape a little bit and  
15 touch on as many key topics as I can. And these other guys  
16 will fill in all of the gaps that I, obviously, will miss along  
17 the way.

18 Let me start just by saying and explaining why  
19 transportation really matters and why electrification  
20 transportation really matters. Transportation is the Number  
21 One largest carbon-emitting sector in the United States.  
22 Transportation causes 29 percent of carbon emissions in the

1 country. 59 percent of those 29 percent of carbon emissions in  
2 the United States are caused by light-duty vehicles. There's  
3 another 23 percent that comes from the medium and heavy-duty  
4 trucks, so a much smaller share of the emissions.

5           Aircraft only accounts for 9 percent of the  
6 total carbon emissions in this country. Rail ships, buses,  
7 motorcycles, all of that other stuff only adds up to another 89  
8 percent or so. So there is virtually no way to do any kind of  
9 carbon goal. Pick whatever you want, wherever you can assess  
10 to go. There's virtually no way to address any carbon goals  
11 without addressing the light-duty vehicle sector. I just  
12 wanted to give you that for context to understand why we sit  
13 here and talk a lot about cars. It's surprisingly a very, very  
14 important part of the carbon emission issue in this country.

15           So what's it going to take to grow the EV  
16 market? And I'll explain some of these in a little bit more  
17 detail as I move along through the presentation. But let me  
18 just mention that there are really three things that jump out  
19 as really key challenges to the address electrification.

20           The first one is, clearly, cost and  
21 affordability. If auto makers could make these vehicles for  
22 \$15,000 or \$25,000, we wouldn't probably be sitting here

1 talking. There would be a lot of industry demand. People  
2 would turn their heads quickly and say, "Tell me more about  
3 that electric vehicle".

4                   That's not what happens today. It's too easy  
5 to get gasoline. It's too easy and comfortable to go to the  
6 gas station. You think it's an okay procedure until you  
7 actually experience plugging in a vehicle, which is a really  
8 delightful experience and really seamless and comfortable in  
9 the safety and security and work of your garage, or carport, or  
10 driveway. So the big key for the auto makers is to take the  
11 cost out of the technology. So that's clearly our number one  
12 priority. But very quickly on its heels is, What are we going  
13 to do about infrastructure? And so installing charging  
14 infrastructure at a fast pace, including a very, very important  
15 and critical role by the utilities, is absolutely critical.

16                   There are two ways to look at infrastructure.  
17 One is the perception that the consumers have about whether  
18 there's enough infrastructure. That is especially important  
19 when you try to get people to pay attention to you talking  
20 about electric vehicles; and do they think there's enough  
21 infrastructure. They don't have any idea of whether they're  
22 going to use public charging, or workplace charging, or home

1 charging.

2                   So the perception is something that's very  
3 visible. It's in a public space. And that has to be addressed  
4 through DC public charging corridors, through key destination,  
5 the museums, the parks, the rivers, the national monuments that  
6 we want to visit. It's all about story-telling and making sure  
7 that everything connects seamlessly.

8                   But the real work horse of EVs is going to be  
9 home and work construction, especially when we talk about the  
10 light-duty vehicle segment. Home and workplace probably do  
11 about 85 to 95 percent -- or account for 85 to 95 percent of  
12 all charging that goes into EVs today; and that's true for the  
13 last 10 years.

14                   So it's a really important way to look at sort  
15 of the revenue opportunity that the utilities will have, what  
16 it means to consumers, and what it means to the utilities and  
17 the revenue staying within your state and growing that little  
18 curve in the states, and what it means to actually download,  
19 managing the charging so it's done with the right type of data.

20                   And then the third real key tenet here -- and  
21 it cannot ever be overstated -- and that's building EV  
22 awareness, just getting the attention of the consumers. And a

1 little bit of it has to do with are the vehicles really  
2 affordable and it gets consumers' notice, or is there enough --  
3 and/or is there enough infrastructure to get them to notice and  
4 they understand that there's something here's that's crazy, but  
5 it's really just something exciting going on. Those two will  
6 help, but there has be a direct effort to get the attention of  
7 consumers and educate them about why there are social  
8 advantages.

9                   There are social advantages. There are  
10 Domestic U.S. social benefits. There are consumer pocket book  
11 advantages. The advantages sort of cross every sector. And  
12 it's almost one of the only times that I've ever seen  
13 something's that's win, win, win all the way across the board.

14                   Who benefits from electrification? The jobs,  
15 the economy, global leadership and technology, what it does for  
16 a consumer and so on. So getting those messages out to  
17 consumers is very, very important. You can do that through the  
18 web's campaigns. The utilities are actually very well-suited  
19 to provide that very educated guidance about how electricity  
20 can be used to move your vehicle to place to place, but also  
21 policies can be used to help accentuate through incentives.  
22 These are also forms of awareness campaigns.

1                   Let's go to the next slide. Let's start  
2 with -- drill down into some of those top three barriers of  
3 what's going on. Incredible progress has been made over the  
4 last 10 years in reducing the price of added technology. This  
5 is the BNEF (phonetic) slide. BNEF is a quite respected  
6 analysis. It also takes away some of the standard. It does a  
7 lot of surveying, and it has some pretty good data.

8                   And if you take a look at how badly the prices  
9 have dropped from 2010 to 2018, you'll see it's been really  
10 incredibly important. So if you're an OEM that's lucky enough  
11 to be sourcing batteries in the year 2018, you'll see that you  
12 might only be paying \$176 a kilowatt hour. Whereas, if you're  
13 stuck back in the 2015 context from the early movers, or let  
14 alone in 2010 when you bought your battery resource from  
15 suppliers, you'll see that, if you're buying them today, you'll  
16 look like you got a pretty cheap battery at 176.

17                   But I just always caution folks. Take a look  
18 at \$176 a kilowatt hour. Multiply that by how many kilowatt  
19 hours it takes to move a vehicle like the Chevrolet Bolt, which  
20 is 60 kilowatts, and you get to a number like \$10,560 for the  
21 battery. I can build a transmission and engine system for  
22 about 3 to \$4,000.

1                   And this is the challenge that auto makers  
2 have -- bus makers, truck makers, all of them -- to try to get  
3 an affordable technology out there. So while they're working  
4 on that in parallel and bringing vehicles to market we have to  
5 be responsible and create that environment for the demand for  
6 those vehicles, knowing that they are actually sitting on top  
7 of the (inaudible) to make this happen; but, in the end, it's  
8 the right goal to have.

9                   If we take a look now at their -- even though  
10 it's happening in the country, let's just take a look at the  
11 map up there in the top left of corner. This is the US market  
12 share in the last year. The darkness of the state shows you  
13 where the load penetration is. Of course Colorado and  
14 California leads in this area.

15                   If I look across at all states, it's about a 2  
16 percent -- a 2.29 percent market share. So that's all new  
17 vehicles sold last year, within the last year, how many of them  
18 were EV? It was about 2.29 percent. If I look all the way  
19 back to January of 2013, they were down to maybe 1.13 percent.  
20 So we've doubled the market share in just the recent history.

21                   So we're getting a lot of progress with EVs.  
22 They're getting much more traction, much more attention by

1 consumers, and work product offerings in the field.

2                   Let's take a look and drill down now to the  
3 Illinois data. So if I look at the top sales by -- or top  
4 states by EV sales -- so just pure sales, not market sharing  
5 now, just the sales, EV sales -- and you think it would  
6 correlate to population or vehicle registrations. You see, if  
7 I look down this list here, Illinois is ranked No. 4 in total  
8 vehicle registrations as a state but No. 9 in EV registration,  
9 so a little bit below where it probably ought to logically fall  
10 if you look at the ranks.

11                   And then if you pop over to the right-hand bar  
12 there, where does Illinois rank if you were in the market  
13 share? Well, I have to actually go below the graft here and go  
14 down to No. 17. So by market share, the penetration of how  
15 many --

16                   Of all vehicles sold today, new vehicles sold  
17 in the state, how many are EV? Illinois is sitting at about  
18 1.1-and-a-half percent market share. So Illinois is probably  
19 under-represented in EV sales; and that's something that we're  
20 here to discuss today, aren't we?

21                   So let's talk about what drives EV sales.  
22 There are a number of things. Nick is going to go into this in

1 a lot more detail. But if I just sort of look at some of the  
2 top motivators and policies and things that states can do --  
3 the federal government can also do these kinds of things; but  
4 at the state level certainly here's the top dozen of the things  
5 that you can do:

6                   You can offer state incentives for the  
7 vehicles and help the auto makers offset that incremental cost  
8 of EVs today. You can offer HLV lane exemptions so that people  
9 in the suburbs can get down to work. They may have an  
10 exemption for fees or whatever on the HLV line. You might have  
11 charging incentives. Utilities may be putting in place public  
12 charging. There are a lot of things that you can do.

13                   If I sort of look at the state map of who's  
14 doing -- of the top 12 marketing key incentives, who's doing  
15 what. You look at California, some of the 9 of 12 things  
16 they're doing. And that's the sort of multifaceted approach  
17 that they have. They sort of -- they've attacked EV  
18 penetration and environmental goals by sort of -- in many, many  
19 directions. It's not just an HOV lane. It's not just an EV  
20 incentive. It's not just an EV awareness campaign. It's that,  
21 that, that. It's two governors in a row that were from  
22 different global parties, and they just keep a regular drum

1 beats (phonetic). They work very hard at it. I think a lot of  
2 people do it. The rest of us have to work a little bit harder  
3 in the other states.

4                   But if you look at this, here's Illinois.  
5 Illinois has done three of the 10. Sometimes it's a little  
6 bit -- we have a decent sense; but still there's some room for  
7 improvement there, looking at what we do when the sun varies.  
8 It was just building codes. It was just simply an EV ready  
9 building code for the new construction. So those are the things  
10 that we were looking at.

11                   Let's take a look at infrastructure. Again,  
12 it's of the landscape. And we talked briefly about -- sort of  
13 a little bit about everything. If we look at just what's  
14 happened in the last few years on EV charging infrastructure,  
15 there's been a lot of progress. So I try to isolate DC  
16 fast-charging because it goes back to that infrastructure slide  
17 that I talked about as a key barrier, especially when you're  
18 talking about DC fast-charging and public perception of whether  
19 there are enough places to charge, whether or not they know  
20 they're going to need it down the road or not, the perception  
21 is there that they have to have much more access to EV  
22 infrastructure.

1                   Look at the map in 2015. In 2015 there were  
2 204 EV charging stations, fast-chargers across the country.  
3 Today, 5 years later, 2,000 chargers, charging sites, with  
4 4,200 chargers cumulative across those sites. So a lot of  
5 progress has been made.

6                   Let's go down to Illinois, down here. You can  
7 see that there are 49 DC fast-chargers across the state, and  
8 much of them are here centered in Chicago. Not bad. 91  
9 chargers at those 49 sites. But if I sort of drill down and  
10 say, "Well, I'm a person who really wants to get an EV, a pure  
11 battery electric vehicle, and my range in my Chevrolet Bolt is  
12 238 miles, it's 209 miles from Chicago down to Effingham, which  
13 is as quick a juncture between the 57 and the 70; so I don't  
14 know if I'm really ready to buy an EV if I make a lot of trips  
15 down South in the state -- you know, to other neighboring  
16 states. I'm just thinking that this is not sort of the message  
17 that you want to be sending to consumers to get them excited  
18 about this technology.

19                   All right. Let's look at what NREL did. It  
20 was about a year and a half ago. They did a really nice model  
21 of the analysis of how much infrastructure would be required.  
22 At least it's a place to put a stick in the grass and say,

1 What do they say? You need to support 15 million plug-in  
2 electrical vehicles in 2030. Just for the sake of the graph  
3 let's say that there are \$15 million EVs, whereas today there  
4 are about 1.3 million EVs in the country today.

5                   So we assumed this, and we assumed all homes  
6 had home chargers, which is a really important assumption here.  
7 What you find out is, if I just look at that across the line,  
8 down there, in the U.S., they project based on intensity of the  
9 EVs, the city environments, and towns, and what you do for the  
10 corridors to connect them for the perception of the EVs. You  
11 need about 8,500 charges locations. And so, if you compare  
12 that to the number on the previous slide, which I think is  
13 about 2,000, we have a ways to go on just the location and  
14 availability charges.

15                   Let's look at the Illinois breakdown. They  
16 actually broke it down by state, again, looking at the vehicle  
17 registrations and so on. And you see that Illinois is moving  
18 at a speed of 880. Compare that to the 49 charges that I have  
19 on the previous slide; so a lot of room to grow here.

20                   Let me quickly go through these last three  
21 slides that I want to show you about how to do this  
22 cost-effectively. What are sort of the three tips that I can

1 think of to look for cost-effective ways to think about and  
2 strategize your infrastructure? One is this really cool map  
3 that Missouri did. Maybe you guys have done it. I don't think  
4 so. I don't think a lot of states have done this.

5                   It's got the utilities organized across the  
6 State of Missouri. They all got in a room over a period of a  
7 few months. And you can see how you had the investors of the  
8 utilities. Like, Ameren has power right now, together with the  
9 co-ops, a bunch of co-ops, and together with a bunch of muni's;  
10 and they, together, organized a map process of "I'm covering  
11 this service territory. I'll commit to putting something in  
12 the juncture, at least a couple of highways".

13                   IDOT doesn't need to be covered, so you pass  
14 through here. I mean, this is a strategy. Talk about  
15 communicating with the other players here to make sure that  
16 there's a plan and no one's overlapping or underlapping. And  
17 that's a very responsible way to go at this.

18                   I also wanted to highlight today building  
19 codes. Building codes -- if you don't start today, you're just  
20 delaying, for another couple of years, the availability of  
21 putting in place wiring -- just some wiring or even the panel  
22 capacity in homes to put in a charger. Whereas, today wiring a

1 home that's not pre-wired for an EV charger can be, on average,  
2 maybe \$1400 for your Level 2 charger if you don't want to just  
3 plug it into the regular outlet.

4           Putting in the codes in advance and just  
5 laying out, again, the capacity of the panel and maybe even  
6 some -- the race wires (phonetic) to make sure that the wires  
7 could be added simply later on is a huge cost savings down the  
8 road for homeowners, dwellers, and common dwellers.

9           And so this code -- I'm very excited to say  
10 that just weeks ago the 2021 version of the IECC -- this is the  
11 International Energy Conservation Codes -- were approved that  
12 included EV readiness for both commercial and residential  
13 areas. This is really exciting. This effort was made over a  
14 couple years time period, and they finally actually did push  
15 through.

16           If you look down here at these maps, who  
17 actually pays attention to IECC codes? Well, Illinois does.  
18 There are only a few states that actually don't adopt IECC  
19 codes eventually; and you see them in white (indicating).  
20 Eventually -- otherwise, commercial buildings and residential  
21 buildings, some -- the darker green have adoption within about  
22 2 or 4 years; and then in Illinois you can see adoption within

1 maybe 5, 6, 7, 8.

2                   This is something that Illinois can jump on.  
3 Just jump on that right now. Grab the IECC codes. There's a  
4 lot of people in this community right here that do a lot of EV  
5 work. They all contributed to defining what would be the  
6 minimum requirements. It's not egregious. It's actually  
7 pretty good.

8                   And then, finally, I was asked to take a look  
9 at the demand -- some work that we did online recently here,  
10 looking at demand charges for EVs. When you're looking at an  
11 early market and you're trying to put infrastructure in place,  
12 you're trying to inspire third parties and utilities and others  
13 to put in place infrastructure; and when you're faced with  
14 costs that can be absorbed, it can be hundreds of dollars a  
15 year. It can be thousands of dollars a year, because we're  
16 just at point where there's very little utilization at these  
17 stations, especially these DC fast-chargers -- maybe 5 percent  
18 utilization. You don't have the revenue to offset the costs  
19 that you put into it, so the demand charges can stick out like  
20 a really sore thumb.

21                   So what we did to our -- we took a look at  
22 three different -- I didn't go into detail. We took a look

1 at -- we did this for the Colorado Energy Office. We looked at  
2 what was proposed for ED rates. We looked at -- we proposed a  
3 new sliding scale that actually offered and put in place lower  
4 demand charge. We had lower utilization stations, like 5  
5 percent; but the demand charges grow over time with utilization  
6 of the stations.

7 That's a logical way to approach this so you  
8 don't set up new barriers for entrance to installing  
9 infrastructure. And then we compared this to what PG & E was  
10 doing out in California and found that this sort of sliding  
11 scale infrastructure was really important.

12 And, lastly, because I have zero minutes to  
13 go, I just want to say if you want information about sliding  
14 scale, rate design; or if you want, we have a brand-new  
15 infrastructure cost that's coming out this week, that's  
16 available at all of these other studies that are really pivotal  
17 and talk about -- kind of answer the questions that are really  
18 key on your minds. All of these are down below and on our web  
19 site. I'll be happy to answer questions afterwards. Thank  
20 you.

21 MR. DANIEL BOWERMASTER: Hi, everyone. So I'm Dan  
22 Bowermaster from EPRI. So EPRI, in case you don't know, we're

1 a nonprofit. We've been around since the early '70s. We do  
2 research on behalf of Society of Illinois Electric Grid  
3 (phonetic). Our electric transportation group has looked at  
4 EVs, big and small, for 3 decades now. So one of the themes  
5 that's kind of funny that's a juxtaposition, sort of a  
6 dichotomy, is that there's really big picture stuff and then  
7 there's really local stuff, both on the vehicles themselves as  
8 well as the infrastructure.

9                   For example, the car companies, they exist in  
10 the global market. China is the largest market. Right now the  
11 EDU, as of a few days ago, has some of the strongest  
12 regulations. You know, so they -- every business has to make  
13 short and long-term decisions to execute on this long-term  
14 probability. That's something on the car side. I think that  
15 that's important to remember when we kind of start talking  
16 about minuta.

17                   On the other side, from the customers -- and  
18 I'm not talking fleet matters here. But each of us as  
19 individuals, if we buy a car today, personal decision. It's  
20 the second largest financial expenditure after a house.  
21 There's emotions to a varying degree associated with what car  
22 or truck you buy. There's obviously kind of your position in

1 life, if you're a single or have a family or what have you. So  
2 the point is that there's this kind of, like, tension between  
3 the big picture stuff as well as the individual.

4                   And on the infrastructure side there's  
5 billions that have been invested in this across North America,  
6 and we'll get into that in a minute. The same time when it  
7 comes down to -- like Britta just said, there's codes and  
8 standards. There's the setup of your house or apartment or  
9 condo; it's the local -- what does the local fire department  
10 say. There's all of this little, little tiny stuff that  
11 actually makes a big difference in whether or not  
12 infrastructure gets adopted, or gets installed, or a vehicle  
13 gets purchased. I think it's important to keep that in mind.

14                   So sales -- and I didn't realize that this was  
15 washed out. It's hard to see. The next slide shows Illinois.  
16 We're about 2 percent of the market. There's about 1.3 -- or  
17 as of '23, there will 1.3 million EVs on the road.

18                   And the county level sales range from zero  
19 percent in some counties to 75 percent in other counties. And  
20 out in California it's normally 22 percent; so it really  
21 varies, as far as how these are being adopted. About half the  
22 vehicles sold are in California. Right now that number is

1 decreasing slowly, but it's in the upper 40s.

2                   Looking at Illinois, you can kind of see the  
3 county level sales, again, is a 12-month average. Anyone who  
4 distributes from Illinois you can probably come up with this  
5 slide on your own. One of the challenges facing the market  
6 right now is that there's about 40 plug-ins that are available  
7 in, largely, the ZEV states (phonetic), not quite, and then  
8 about a dozen that are available in non-ZEV states. So that's  
9 the first kind of level. And then the second level down from  
10 that is whatever the dealers choose to stock. But that's  
11 something else to remember is that the car companies have zero  
12 control over these dealers. Each dealer is an independent  
13 business, and they make their own decisions, again, to execute  
14 their own goals.

15                   And the good news, looking ahead, is right now  
16 there aren't -- the U.S. car market is largely -- is about 60  
17 percent SUVs, 4 percent cars. And we've seen headlines about  
18 how SUVs have exploded in popularity. Also, the big trucks are  
19 the best selling cars in the U.S. year after year. 7 of the 10  
20 best selling cars are actually trucks, SUVs, crossovers.

21                   But the point is that, if you look at -- the  
22 blue -- that blue section of the truck there is the number of

1 SUVs, crossovers, and trucks -- or excuse me -- SUVs and  
2 crossovers that are announced by the OEMC (phonetic), released  
3 after 2023. So point is that customers, maybe not today, but  
4 over the next, say, 2 or 3 years are going to have more  
5 plug-ins to choose from than, say, maybe the more broader  
6 vehicle market is doing today.

7                   Yesterday the CES showed Vegas, Jeep, plug-in  
8 hybrids, crossovers, SUVs that were plug-ins from Audi, BMW,  
9 and Toyota, and others. So this is coming; but right now, you  
10 know, if you're in the market for, say, an all-wheel drive  
11 plug-in, they're in a relative area. There might be a few in  
12 the future there. And, yes, there are plug-in pickups coming  
13 from companies, big and small, in a few years.

14                   It's also important to remember the larger  
15 vehicles that -- we'll have later speakers talking in more  
16 detail about this, but there's more than 2 dozen different kind  
17 of vehicles ranging from garbage trucks to tractors and ferries  
18 and et cetera, and all kind various states of development. You  
19 know, electric transit buses I would say are some of the  
20 furthest along; and Kate will talk about that later.

21                   It's important to remember that all of these  
22 vehicles, they have a job to do, so this is not an emotional

1 vehicle. This is a job that picks up your trash, or delivers  
2 your kids to school; or, if there's people around laying  
3 outside -- you know, they have a very specific job to do. And  
4 these fleet managers have been burned by all fuels over the  
5 year. So between their mission as well as they're history,  
6 it's understandable that a fleet manager would have been  
7 reluctant to switch to fuel; and that's even before you add in  
8 the financial -- you know, however the finances are structured.

9                   But the point is that these are coming. We've  
10 seen a big swing over the last 4 years. You know, on the  
11 larger vehicle side there used to be a huge push for compressed  
12 natural gas; and that continues in some spot. You know, it's  
13 kind of an all of the above type fuel strategy. We're seeing  
14 more battery electrics, plug-in efforts, and even some  
15 measuring fuels.

16                   So what are the utilities doing? So this maps  
17 looks at the North American, Canadian friends proposed or  
18 approved utility infrastructure programs. It's important to  
19 remember, you know, as Britta mentioned, that these all -- in  
20 addition to the charging infrastructure, nearly all of these  
21 included a degree of customer education and outreach; and I  
22 agree that's a very important factor.

1                   You know, these -- for those of you who aren't  
2 involved in the regulatory process -- again, EPRI doesn't  
3 involve you one way or the other on policy, but there's a lot  
4 of discussion who owns the last 10 feet or who owns the last 20  
5 feet, and that will continue regardless of, you know, all of  
6 the utility work to that last 10 feet.

7                   The point is that it's a significant amount of  
8 money. You know, Nick is going to go into more detail about  
9 this. But how I see it is there's kind of, like, one or four  
10 tronches (phonetic) right now for infrastructure funding.  
11 There's kind of the stimulus package that Wall Street put  
12 together 5 or 6 years ago. There's been government money  
13 since. There's utility money. And I'm sure there's one I'm  
14 missing; but the point is, again, it's an all of the above type  
15 strategy. It's how do you maximize that dollar spent for that  
16 infrastructure.

17                   Looking at Illinois, it says -- basically,  
18 we're just going to look at the data that represents the  
19 location of charging stations that develop over time of both  
20 Level 2, which is compartmental (phonetic) charging as well as  
21 fast charging.

22                   I was asked to kind of talk about lessons

1 learned that was, from our perspective, these two final sides,  
2 one on EV and one on infrastructure. You know, at the end of  
3 the day, like, very few of us in this room can impact what EVs  
4 are designed. It's important to note that EV technology has  
5 improved a lot over the last couple of decades not just on the  
6 batteries, but that's a big one that Britta talked about, the  
7 cost going down.

8                   Sales are impacted by policy and incentives  
9 and customer choice. We just did a study on, basically -- we  
10 tried to answer the question of if the Utility had a dollar  
11 amount that they invested to grow -- to increase EV sales, if  
12 that was what they were directed do; and, you know, I said, "Do  
13 they put a dollar under the hood of the car. Do they do rates?  
14 Do they encourage carpooling access?" And what we found is  
15 that, yes, money, basically, across the U.S. -- money affects  
16 every one.

17                   Then the next interesting thing to me was,  
18 basically, kind of where the customer was. If you're in an  
19 area of high congestion and carpooling and the EV gave you  
20 access, and that was to if you're in a place that definitely  
21 has much other in the ways of infrastructure programs, then  
22 infrastructure goes down too. If you're in that area of high

1 fuel prices and high electricity prices, then off-peak rates  
2 are the second kind incentive for customers. So, again, this  
3 is an example of the utilities from kind of coast to coast; and  
4 it was interesting to see what the study said.

5                   So on the infrastructure side this is, again,  
6 more of the utility than EPRI. The first thing that I want to  
7 say is the grid can handle EV charging. When we talk about  
8 this, you know, breaking the grid down, it's more that the  
9 utilities provide safe power every day. You know, when we talk  
10 about I-power charging, that's kind of like the Walmart; so  
11 we're not talking about, like, Walmart breaking down the grid.  
12 I'm not trying to say that it's not without consequence. It's  
13 just a ton of hard work goes into keeping the lights on not  
14 just for the utility, but everyone involved.

15                   And it's more of a -- at least from where I  
16 sit it's more of a question of -- when we start talking about  
17 these, especially like the high power charges, it's like how do  
18 we do this where it meets the customer's expectations, whether  
19 that's a homeowner, or a private company-- how do we meet that  
20 expectation, which is usually kind of customer service and how  
21 long it takes to get power there. And what's the cost to them?  
22 What's the overall cost to the ratepayers, sort of the broader

1 appearance of customers in that area. And that's where the  
2 big, kind of, like, future aid comes in; and that's good.  
3 That's what we should have.

4                   What we've also found is that -- and this is  
5 the fully electric -- there is public charging infrastructure  
6 that's needed that's higher power, in terms of how much, where  
7 and when. I that map, that picture of Missouri. That's a  
8 great way to look at it. Because there's -- I would caution  
9 people -- I would caution all of us to think about -- the  
10 answer might not be opening high power charging everywhere. I  
11 think it's more of a portfolio strategy.

12                   My boss came up with that charging pyramid  
13 years ago. The thought there was always, like, about 75 to 80  
14 percent happens at home, largely overnight. The 15 or 20  
15 percent happens at work. The remaining kind of 1 to 5 percent  
16 is public. And public's important because it's like on  
17 Thanksgiving when you want to drive to your grandma's house, or  
18 December when you want to drive to the next town and go faster.  
19 So that public part is important. We can't ignore it. But  
20 what we've found from some additional data is that number  
21 really is like 80 percent. We have 15, 16 percent happen at  
22 work. And then you're at 2 or 3 percent for public. So, you

1 know, you don't want the tail to wag the dog when it comes to  
2 public charging. That's quite important. It's also important  
3 to keep things in perspective.

4                   As we think about that, then it's like what  
5 can we do broadly as a stakeholder. There's been a ton of work  
6 already done. Building codes are mentioned. There's a lot  
7 with fire and local planning. How do you help your customer,  
8 again, whether it's a fleet or individual or workplace? When  
9 it comes down to it, we're all humans. We can exist without  
10 it, but we all have a million and one other things going on.  
11 I'm sure the people in this room have a million and one other  
12 things going on. We have a life. We don't want to figure how  
13 much is the kilowatt hour and what does that mean in dollars  
14 per ounce. We're humans. I'm an engineer not a psychologist,  
15 so take this with a grain of salt. But we're used to, like,  
16 getting gas. It's a dollar per gallon. We all get that.  
17 Going to the gas station is not -- one you switch to an EV it's  
18 more like a phone. This is great. I wake up in the morning.  
19 The car doesn't stay over night. You program it once, and  
20 that's great; but, you know, there's this human part, too, that  
21 I think is extremely important. This goes back to that  
22 education piece. And, you know, it's not just the utilities

1 doing the education, or the companies, or the nonprofits, I  
2 think it really takes a village. And that's something that  
3 we've learned out of the past.

4 So I think I will leave it at that. And I  
5 look forward to your questions. Thank you.

6 MS. NICK NIGRO: Thanks. So first I just want to say  
7 thank you to Commissioner Bocanegra and the other Commissioners  
8 here, and all of the Staff for organizing such a great event.  
9 Britta and I were talking about, just before things got  
10 started, this is the best organized event. Printing our names  
11 on both sides of the tent cards, this is some real thought that  
12 went into putting this all together, so thank you for that.

13 So for my slides now, my name is Nick Nigro.  
14 I work. I work in Atlas Public Policy. I'm also the senior  
15 advisor for the Alliance For Transportation Electrification.  
16 So I was asked to talk about public policy, rules of utilities,  
17 what goes on with funding opportunities. Before I get into  
18 those details, I just want to rate some of the points from my  
19 colleagues here.

20 First, the reason that electric vehicles are  
21 so successful and, in my opinion -- or at least the opportunity  
22 for transportation electrification is so big is because of that

1 progress with batteries. I just want to reiterate that point.  
2 The steep, steep decline in the costs for a kilowatt hour of  
3 energy from a battery is making the tent for electrification  
4 significantly bigger than any of us who has been working in  
5 this space for 10 years would have thought were possible back  
6 when we first started.

7 In the beginning it was all about plugging in  
8 hybrids, trying to get people into 75-mile-an-hour commuter  
9 cars. Now we're talking about Class A tractor-trailer electric  
10 vehicles. Transit buses are cost competitive with -- electric  
11 transit buses are cost competitive with diesel transit buses on  
12 a total cost margin basis now because of what we've done with  
13 batteries.

14 The tent is big. Also the opportunity is big.  
15 We have a product that's called EV hub where we track data on  
16 this space, and we've tracked over \$350 billion in announced  
17 investments by private companies into this space. So where is  
18 the United States? How much of that money is going to get  
19 invested here? In my opinion, that's up to us as folks who  
20 work in public policy to make sure that this is an attractive  
21 market for those dollars to be invested. And for those dollars  
22 to be invested we have to be an attractive market for the

1 product. So we have more work to do, but the opportunity is  
2 clear.

3           The 2010s were kind of about getting started,  
4 honestly and having a 75-mile-an-hour range Nissan LEAF, which  
5 was great but didn't fit a lot of people's needs. The Chevy  
6 Bolt, which was a great piece of engineering; but the 2020s  
7 could be the last decade where internal combustion engines are  
8 the undisputed leader of transportation. That's the  
9 opportunity.

10           So what we have to do now, as people who work  
11 ing policy, try to lay the groundwork so that we can -- the  
12 U.S. at least -- can be competitive because the rest of the  
13 world is not sitting idle and saying, Oh, what's the U.S. going  
14 to do on this. Let's follow that. They're in front of us in a  
15 lot of cases.

16           That's my company. We started about 5 years  
17 ago. We're not quite as old as EPRI, but we do a lot of work  
18 in this space, in transportation electrification. What we're  
19 trying to do is bring data to this space, to our customers and  
20 people who are in public agencies, like the state of  
21 Washington, the state of Tennessee, the state of New York. We  
22 also work with nonprofit advocacy organizations to make sure

1 that they're grounded in fact and also some private companies  
2 as well. So we try to sit at the intersection of all of the  
3 people working in policy.

4 I mentioned this product EV Hub we have. If  
5 you work at a public agency, it's free. If you work at a  
6 private company or NGO, you will find it would be pretty  
7 affordable, but really the intent of the product is to try to  
8 give all of the information that you need if you're working in  
9 policy transportation electrification in one spot.

10 Just out of curiosity, who had heard of EV Hub  
11 before this event? I just want to know.

12 (Hands raised.)

13 MS. NICK NIGRO: Great. It's working. So to the first  
14 slide I wanted to talk about is -- before I get into the  
15 utilities, and Volkswagens, and settlement funding and such is  
16 a critical program that kind of lays the groundwork for state  
17 action in transportation electrification. Unfortunately where  
18 I'm from in DC we're not doing very much in Congress and the  
19 federal government right now to advance this technology -- or  
20 at least as nearly as much as we could be doing.

21 And so as with so many other issues, we look  
22 to the states to take the lead in experiment and trying new

1 things. And the ZEV program is one of corner stones of a lot  
2 of the states that have been leaders in this space. It's not  
3 Panacea (phonetic). Being part of the zero initiative vehicle  
4 program started by California some years ago is not going to  
5 guarantee that you're going to have vehicles sold in the state,  
6 but it is an important part of that.

7                   And for the first time in many, many years the  
8 number of states that are a part of the ZEV program started to  
9 grow last year. And I think that was a reaction, frankly, to  
10 the need for states to start to lead and to try to create more  
11 demand for the products in their regions. So Colorado, New  
12 Mexico, Minnesota all took steps. Colorado actually joined the  
13 ZEV program. Minnesota and Mexico took the first steps towards  
14 it.

15                   When I think of a state like Illinois where  
16 you'll have a great start at trying to make a vehicle in this  
17 state. I think that it's important. If you want to be a part  
18 of the ZE program, that would be a way of helping to encourage  
19 that. That's not something that the Commission is going to do,  
20 but it is something that I think is important. And one last  
21 stab on that. Almost two-thirds of the EV sales are in ZEV  
22 states.

1                   So I'm sure everybody's heard of the  
2 Volkswagen settlement. It was the single largest environmental  
3 settlement in U.S. history done right after the Obama  
4 Administration. And it is infusing billions of dollars into  
5 reducing emissions from the transportation sector. And for --  
6 the good news for folks who are working in electrification, a  
7 lot of money is going to be going into transportation  
8 electrification. \$2 billion dollars of that settlement is just  
9 for a subsidiary for a Volkswagen that's called Electrify  
10 America. They're building fast charging stations all over the  
11 United States including here in Illinois.

12                   But that's only one part it. The part that's a  
13 lot more nuanced and a lot more wonky, if you will, is the  
14 environmental mitigation trust; and that's controlled by the  
15 states. Every state got a tranche of money from -- as part of  
16 the settlement based on the number of Volkswagens that they  
17 actually had their states. So Illinois has millions of dollars  
18 to spend.

19                   And if you look at how that's going so far,  
20 how is electric technology competing against alternative  
21 technologies. Because the settlement is not saying let's get  
22 EVs out there, necessarily. It's about let's reducing

1 emissions from the transportation sector. So far  
2 electrification is competing really well. And I can go back to  
3 my original point about where the opportunity is.

4           A lot of states are seeing -- this is not  
5 something that we expected to have as a state, all of these  
6 millions of dollars. So let's make a long-term investment.  
7 And to that end, about 50 percent of the money that's been  
8 awarded so far from the settlement is going toward  
9 transportation electrification. It might not be easy to read,  
10 this pie chart. But the biggest piece of that chart are those  
11 transit buses, because I think, in my opinion also, not just  
12 the opinion from the data, but transit buses are probably the  
13 most promising near-term opportunity for EV energy  
14 electrification, and it's evident from the numbers: federal  
15 government, federal transportation administration pouring hundreds of  
16 millions of dollars into doing electric transit buses. Lots of  
17 cities have committed to going all electric. So a lot of  
18 problems there. And the Volkswagen settlement is a great kind  
19 of kick start for that.

20           Charging stations are also very popular for  
21 deploying these funds, light-duty electric vehicle charging  
22 station. I know Illinois now, I believe, allocating the

1 maximum 15 percent of their funds towards that. Most states  
2 are doing that. Nearly every state is putting at least some  
3 money toward light-duty infrastructure. And that's helped fill  
4 in a lot of that charging gap that Britta mentioned from the  
5 Natural Illinois Energy Lab Study.

6                   So, in total, about half the states have made  
7 awards for transportation electrification; as of last month,  
8 almost \$200 million dollars. School buses, too. You know, I  
9 would say that school buses are further behind than transit  
10 buses in the same way sort of where trucks are right now.  
11 They're not an easily mass marketed product. They're still  
12 just in their infancy, but these are great opportunities to  
13 start to get some of these vehicles out there into fleets so  
14 that they can start to experiment and understand how those  
15 vehicles made it successfully into their daily operations.

16                   Moving on to utilities. So Volkswagen  
17 Settlement, billions of dollars. Private sector, lots of money  
18 as well. The other big funding opportunity for infrastructure  
19 in the near term is from the electric utility industry. We  
20 track all of the proceedings that are going on across the  
21 United States related to transportation for EV Hubs, our  
22 product. And on what you're seeing here is the current status,

1 essentially. \$1.3 billion dollars has been approved by  
2 Commissions across the country \$1.4 billion dollars is on the  
3 table. A lot of that money is for charging infrastructure.  
4 Some of it's for actually rebates and discounts on vehicles  
5 themselves, but a lot of that money is going to go into  
6 infrastructure. Some of it is going to go into consumer  
7 education.

8                   To Britta's point about where the utilities  
9 are going to be placed around the world, there's just,  
10 essentially -- this is where a lot of the action is, if you  
11 will, on the infrastructure side of things and really laying  
12 the ground work for those second generation of electrical  
13 vehicles that are coming this year, next year, and the year  
14 after.

15                   There are some denials, too. And I know we're  
16 probably going to get into that in the discussion. So it's not  
17 always on the -- it's not a slam dunk. The utilities aren't  
18 batting a thousand, essentially, when they try to do these  
19 proposals. So there is a process that's being established  
20 slowly but surely, in terms of good practice. And what I will  
21 say right near the top of that good practice is what we're  
22 doing here, getting the community engaged early on in this

1 process, making sure people are on the same page about what the  
2 opportunities are, what the proper goal is for the utilities in  
3 supporting this industry. Having these kinds of forums is  
4 critical to success.

5                   So it's not just the coast, if you will,  
6 that's really engaging from the utility perspective. It's all  
7 over the country. In fact, the Midwest was some of the first  
8 utilities to issue proposals for transportation some years ago.

9                   What you will notice from that slide is lot of  
10 this activity by your neighbors. So it's good to see that, and  
11 I think Illinois -- you guys have an opportunity to help lead  
12 in this region, and it's something where --

13                   As utilities issue initial filings, sort of  
14 pilot projects, to learn about what they might do, what their  
15 role might be, that's sort of the first steps of the follow on  
16 proposals that come out of California. They're more about  
17 scaling up. So that's generally been the progress so far, but  
18 you can see it's widespread throughout the country.

19                   On the top here of this chart is the timeline;  
20 and, basically, that ramp-up is kind of very similar to the  
21 ramp up of sales, frankly, from a passenger vehicle perspective  
22 as the market was evidently growing. As more vehicles got on

1 the road it was clear that the electric utilities need to play  
2 a stronger role into ensuring that there would be an adequate  
3 amount of infrastructure for those vehicles. So we saw a  
4 considerable ramp-up in 2018, even more new proposals in 2019,  
5 and I can -- there's no reason to expect that that will slow  
6 down in 2020.

7                   And so what are the Utilities proposing so  
8 far? A lot of it is about infrastructure, which makes sense,  
9 charging station. And to what extent is the Utility -- what  
10 role are they playing? It really varies by the state, by the  
11 utility, what their strategy is. In some cases they do rebates  
12 for charging stations, for residences. Sometimes it's, "We're  
13 go to own and operate and fill in the gaps in the charging  
14 infrastructure that the private market is not doing. Sometimes  
15 they'll fund programs where -- which are known as make-ready  
16 programs where they will, essentially, cover the costs all the  
17 way up to the charging station onto the equipment. That's  
18 usually about 3 quarters of the cost of the installation, so  
19 that can be a considerable advantage to a third-party that's  
20 trying to install infrastructure.

21                   So really where, and how, and who they're  
22 targeting, all of that kind of depends on the program and the

1 state where the gaps are. EV rates are also an important part  
2 of this in ensuring that vehicle grid integration is done  
3 smoothly. We didn't talk about this yet, but there's been a  
4 lot of research, essentially, that's been out. In theory,  
5 electric vehicles, when charged properly, will generate a lot  
6 of benefits for the ratepayer. A lot of studies have been  
7 done. EPRI did a study. The U.S. DOE (phonetic) did a study.  
8 Lots of independent institutions have done studies.

9                   We're starting to get data on that finally to  
10 see how that's played out. You can look at California to kind  
11 of see where the future might, considering how many vehicles  
12 they have on the road today. And the data that came out last  
13 year indicates that there were a considerable amount of  
14 additional revenue for the utility for those programs than what  
15 their programs cost. Essentially, a huge benefit to the  
16 ratepayer that was generated from these charging programs by  
17 California.

18                   That was additional revenue that ended up  
19 going back to the ratepayer in some form in that state. So  
20 that's good news. It was just theory. There was also some  
21 practice there to demonstrate that benefit.

22                   Okay. Just in time.

1

(Laughter)

2

COMMISSION MODERATOR: Thank you all of our panelists for  
3 the first discussion. That was excellent. We have some time  
4 for questions. I'd like to begin first with asking any of the  
5 Commissioners have questions for our panelists?

6

COMMISSIONER OLIVA: Nick, based on your experience, why  
7 are other commissions denying electrification proposals or  
8 pilots?

9

MS. NICK NIGRO: So the answer to that is it kind of  
10 depends. In some cases the utility proposal is unexpected.  
11 There was a lot -- there were some first movers early in the  
12 day in some states, Missouri, for example, where the proposal  
13 wasn't sort of expected by the Utility -- by the Commission, I  
14 should say; and so the role of the Utility was unclear at that  
15 point.

16

In addition, there are other states where  
17 there wasn't as much, I would say, buy-in from the stakeholder  
18 community. A good example there is in Michigan where the  
19 Commission was supportive of utility engagement in this  
20 industry, but it wasn't clear exactly if the proposals that  
21 were put forward were a reflection of what the community  
22 believed was the proper role; and so those denials were led to

1 subsequent filings that were a product more of community  
2 engagement and such, and those subsequent filings were  
3 approved.

4                   So the short answer is it depends, but I think  
5 the long answer is I think you want to ensure that the  
6 community -- these forums like we're doing here -- take place  
7 so that the role of the utility is clear. Success often comes  
8 through signals from policymakers, whether it be governor or  
9 the legislature, that indicates that there is a proper role  
10 for the utility. I think having a forum like this is a good  
11 way of helping to establish what that role should be.

12           CHAIRMAN ZALEWSKI: I think all of you mentioned the  
13 benefits to consumers. And I'm wondering -- you kind of talked  
14 a little bit about costs for consumers. Is that in regard to  
15 absorbing some of the intermittency for renewables for the time  
16 of use, or is that for a different reason? Can you just expand  
17 more on what you meant? In your last slide you talked about  
18 how it was beneficial to consumers.

19           MS. NICK NIGRO: So the amount of revenue that gets  
20 generated into kilowatt hours that are used in the system  
21 generates a lot more revenue for the utility. At least in the  
22 case of California, from an evidence standpoint and from nearly

1 all of the research that has been done on this topic from a  
2 theoretical standpoint, there's more revenue that gets  
3 generated than the cost of the programs. It's fairly as simple  
4 as that.

5                   There is going to be to be -- you'll have to  
6 make sure that some charging is done at the appropriate times,  
7 but in the case of California, you know, that to me is so far  
8 the best example where you see tens of millions of dollars of  
9 additional revenue that will go back to the ratepayer.

10           COMMISSION MODERATOR: Any other questions from the  
11 Commissioners?

12   (No response.)

13           COMMISSION MODERATOR: Does anybody in the public have  
14 any questions?

15   (Hands raised.)

16           COMMISSION MODERATOR: Also, when you ask your question,  
17 please state your name very slowly for the court reporter.

18           MR. CHRIS PENA (PHONETIC): Chris Pena from Siemens. I'm  
19 going to pick on you Britta.

20                   In the recent congressional tax package, the  
21 incentives for tax credits for most vehicles and the charging  
22 equipment were not included. I'm wondering what you think that

1 might do, in terms of the effect on the market.

2 MS. BRITTA GROSS: Well, if George is any example, right,  
3 the \$5,000 State tax credit for electric vehicles was in place  
4 and fell away in 2015, and EV sales just plummeted. There's  
5 going to be some of that. It might be -- you know, with an  
6 Atlas gain now for 9 years of two automakers, Tesla and General  
7 Motors, who have now reached a point where they've sold 200,000  
8 and reached that cap, which means now incentives is now  
9 expired. It's really unfortunate. This is politics at play.

10 And that was really unfortunate. It is the  
11 number one way to motivate sales. It's what Norway did. It's  
12 what China did. It's what the Netherlands have done. Where  
13 you have success is where you're going to stay. Whoever said  
14 it here, Dan or Nick, where we don't have a national vision the  
15 states are going to have to -- let's get active and pay  
16 attention to what this means to the revenue equation for your  
17 state, either detracting federal dollars for the state by  
18 putting in the infrastructure and drawing several thousands is  
19 really what the state does. It's really important what the  
20 state does. At one point, for financial reasons it stopped a  
21 few years ago.

22 It's really important. I don't give up hope.

1 I think that because you saw the battery numbers, I want to  
2 explain how you do math to understand what the incremental cost  
3 of these batteries until we get to something more, like, \$70 a  
4 kilowatt hour, which that's in the foreseeable future just not  
5 today, I think in a couple of years let's see if maybe we can  
6 have a real national industrial strategy and energy strategy  
7 combined that really looks at this and says this is in our  
8 national interest to have a very strong program here, and it  
9 will be -- it may need some incentives just for a few years.

10 MR. CHRIS KENYA: And I think it's good news that Tesla  
11 sales were strong.

12 MS. NICK NIGRO: If I can build off that last point that  
13 you just made. Tesla's sales were very strong outside of the  
14 United States this year in part because the incentive wasn't  
15 there. They were moving to where they were easily selling  
16 vehicles, so they sold a lot of vehicles abroad. This goes  
17 back to me point about whether or not the United States is  
18 going to be an attractive market to create demand for this  
19 product in the near term. That's up to us in the policy making  
20 community.

21 Because the tech is going to get there.  
22 They're going to get to cross parity. They already are in cost

1 parity from total cost perspective in a lot situations, but  
2 they're going to get there in the upfront perspective in the  
3 immediate term in this decade. So it's up to us to have a  
4 policy free market in place, but it kind of sets us up for  
5 having that demand in this country.

6 MR. CHRIS KENYA: Thank you.

7 COMMISSION MODERATOR: Anyone else? We have time for one  
8 more question.

9 MS. JULIANA PINO: Thank you. My name is Juliana Pino.  
10 I am the Little Village Environmental Justice Organization. My  
11 question pertains to policies and programs specifically focused  
12 on expanding access to all consumers.

13 You know, in hearing the studies, the general  
14 perception from communities, there is still a feeling amongst  
15 many consumers that electric vehicles are luxury goods and that  
16 they're not delivering additional benefits, nor will they  
17 benefit the entirety of the society.

18 I'm wondering if you have examples from other  
19 states that really focused on the issue of low income access  
20 and that look at what kinds of principals and practices have  
21 been successful at truly equitably delivering the benefits of  
22 electric vehicles.

1           MR. DANIEL BOWERMASTER: So let me just tell you what  
2 EPRI'S observed. So it's a great question. There's a couple  
3 of ways to think about it. There's, first, the vehicles  
4 themselves. And it's important for all of us to remember  
5 that most of the car market is actually used cars. So think  
6 about electric vehicles, money not owed not just for the first  
7 owner but money owed for the second owner. A lot of these  
8 vehicles -- I think it's north of 65 percent -- there's an  
9 actual lease, so that means they're only in the hands of their  
10 first owner for, say, 3 years.

11                       But to your question, then by the time you get  
12 that charging infrastructure installed, whether it's from the  
13 community, or home, or what have you, and they're a renter, by  
14 the time you install those kinds of barriers, I think that a  
15 key portion. There have been different examples around the  
16 country that have done that.

17                       And the second thing to think about when we  
18 they about, you know, in terms of benefits -- so the greenhouse  
19 gas piece gets talked about a lot. The piece that doesn't get  
20 talked about a lot is the improvement to air quality. So when  
21 I talk to family around the Thanksgiving table, it's like "Oh,  
22 greenhouse gas is like stove and you slowly turn it up; or, if

1 you're a kid, building a fort and putting your head under the  
2 blanket. The other part is all of the tail pipe emission, and  
3 that directly impacts human health. It doesn't matter kind of  
4 where you are. It's the oxides, the nitrogen, it's the soot  
5 coming out of a tail pipe that that impacts all of our health,  
6 and especially for the very young and very old.

7                   So there are benefits for people in general.  
8 There's no shortage of challenges, especially when you think  
9 about the infrastructure installation piece, but it does  
10 benefit society in addition to the financials of it.

11           MS. BRITTA GROSS: And I would just add transit -- it's  
12 very exciting to see money being spent on transit buses. And,  
13 again, a lot of people will benefit from that, having exposure  
14 to either school bus or transit buses that are electrified;  
15 health benefits, and air quality benefits, and then you know  
16 pocket book benefits too. So I think that's really important  
17 here, too.

18           COMMISSION MODERATOR: Okay. Thank you so much for that.  
19 We need to take a break right now so that we don't run over too  
20 much. Thank you to all of our panelists.

21   (Applause.)

22   (Whereupon, a brief recess was taken.)

1           COMMISSION MODERATOR: Thank you for everyone coming back  
2 in a timely fashion. Now we're going to start with our second  
3 panel entitled Driving Forward in the Public Interest: How  
4 Demand, Fleet Investments, and Deployment Shape EV Integration.  
5 I'm going to introduce our three panelists. As before, there  
6 will be the presentations and we'll have some time for  
7 questions at the end.

8           First with us today is Alexander Keros from --  
9 he's the lead architect for EV infrastructure at General  
10 Motors. Next to him is Kate Tomford. She's the senior analyst  
11 for the Finance Department at the Chicago Transit Authority,  
12 which Chicago knows as the CTA. And then there's Phil Jones,  
13 the executive director of the Alliance For Transportation and  
14 Electrification. Thank you.

15           MR. ALEXANDER KEROS: Thanks, again, for organizing  
16 Commissioner and a great dialogue. Maybe before I jump too  
17 into the details, you know, sort of reflecting on some of my  
18 best friends from the last 10 years and the words they said  
19 over the last hour; but there was words about sort of taking a  
20 village to make this work and the need for community  
21 involvement to be successful.

22           And the way I like to sort of characterize it

1 and have is my son Andrew was born right about the same time  
2 that we were launching the Bolt. He's now 9, and he is going  
3 into third grade and struggling with what third-graders  
4 struggle with, which is he's sort of popular, he's sort of not.  
5 He's trying to figure out, "Do I grow up and get smart, or do I  
6 play more sports; and, if I'm not good at sports, then what  
7 does that mean?"

8                   And the point I make is, like all of us who  
9 raise kids or have a family with kids in it, it takes a lot;  
10 right? We don't kick their butt out of the door at Year 3.  
11 Usually it takes about 18.

12                   (Laughter.)

13           Alabama: Usually it takes 18 years in many respects, and  
14 sometimes sooner and sometimes longer, to get them into a  
15 position to be successful. And it's fun for me to judge where  
16 we're at in life against my son and where I'm at as a father  
17 and where he's at in his growth development period. And he's  
18 also to blame for this voice, so I apologize. But it's a need  
19 to see how things have to grow up and really to echo what they  
20 said; and certainly my perspective and General Motors'  
21 perspective is to do this successfully, A, it's possibly more  
22 of a marathon than a sprint, which sucks. I think we all want

1 it to be a sprint. But also it takes a lot of energy and a lot  
2 of thought into making it right. My family comes from the  
3 restaurant business, so I liken it to recipes; right? You can  
4 have regional recipes that all work, but you need multiple  
5 ingredients in that recipe to make that work. And all of us in  
6 this room, I think, have an ingredient to offer or thoughts  
7 about how to adjust those things.

8                   So, as this is, hopefully, one of many  
9 conversations in the future in Illinois on how to make the  
10 Illinois recipe successful. You know, I just give you that  
11 little bit of insight of, "This is not easy. It's hard work,  
12 and it takes a lot of time and effort amongst all of us to be  
13 successful". You know, we -- I think when Mary announced this  
14 sort of 000, it was a really neat way of coalescing around some  
15 really important things in sort of the development of  
16 transportation. She has famously said, you know,  
17 transportation doesn't change in the last 5 or 10 years more  
18 than within the last 50. And she's spot on. And this is  
19 really a rallying call for our team; and I am blessed  
20 internally to be able work on, essentially, all three of these,  
21 both on the electrification side and the mobility side. But  
22 this is, as it says, our driving force to be successful.

1                   Also, you know, I think Britta, Dan, and Nick  
2 sort of characterized this as well, but it's also important for  
3 you to here it out of an automaker's point of view. What sort  
4 of matters in this market and what have we learned over the  
5 last 10 years. As an owner of three different EVs how do we  
6 get this market better and how do we expand it over time? And  
7 they certainly hit on key aspects. Longer range. People need  
8 to feel comfortable with the vehicle and the affordability of  
9 that range are very important.

10                   Infrastructure continues to raise as a key  
11 issue. As Britta said, as Dan said, the triangle of home,  
12 work, and workplace -- or home, work, and public; but how do  
13 those pieces come together are really, really critical. And I  
14 think we see ourselves as important lynch man in making sure  
15 that's successful.

16                   And also the what, the performance of the  
17 utility, the form factor of the vehicle become very very  
18 important. We were obviously on the record over the last  
19 couple of years of bringing the Bolt. It's not 237 miles  
20 anymore. It's 259 in the 2020 Bolt EV; and our goal is to  
21 continue to expand that while lowering costs; right? We have  
22 to do both at the same time to bring it into mass market; but



1 few week ago, in the early December, we made an announcement  
2 with LG (phonetic) venture for a plant in other states, but  
3 really around driving down the costs and really pairing what  
4 we're good at, manufacturing, as well as LG Kemp (phonetic) is  
5 really good at, which is the advanced technology. That is  
6 another step. Right? This is a billion dollars investment,  
7 2.3 billion to be specific, in trying to drive it, right, it's,  
8 bringing 1100 cars to an area. That's also equally important.  
9 These things will continue to happen and need to continue to  
10 happen further to really drive the costs out of batteries.

11           Also -- and I'm keeping my comments short, so  
12 perhaps we can get to more questions; but, you know, my  
13 responsibility within GM and what I'm charged with is really  
14 the infrastructure piece. And when Britta and I started this  
15 10 or 15 years ago, a lot of it was around sort of readiness  
16 and just getting prepared and if figuring out sort of the what.  
17 I think today when you would ask my leadership what's my job  
18 really? How scarce is the job in general? It's to make sure  
19 that infrastructure encourages the adoption of EVs. Right?  
20 It's not a competitor. It's that it encourages. And what we  
21 failed to do as an industry -- and we can all be better at it  
22 is -- for example, when I ask people how long does it take to

1 charge a car, everybody says it's always the 3 kilowatts or 7  
2 kilowatts in 4 hours or those things.

3                   The real answer is 99 percent of the time it  
4 takes you about 10 seconds to get your butt out of the car and  
5 plug it in. That's the answer, because none of you know how  
6 long it takes to charge a phone. If you do, maybe we should  
7 talk.

8                   (Laughter.)

9                   Alabama: It really is not something 99 percent of the  
10 time that you're going to have to worry about, because you're  
11 going to bring it home, you're going to plug it in. The place  
12 where you live, you're going to have placed to charge at work.  
13 And that is really what my charge is, is how to figure out this  
14 and how to think about it across these verticals.

15                   What I want to reinforce -- and I think Dan  
16 and his boss would agree with me -- when you think about that  
17 triangle, do not think about that triangle as a priority. Do  
18 not think about it as because we have most of the charging at  
19 home we should focus most of all of our effort in the home.  
20 It's probably more about how do we balance the priorities and  
21 make sure they're all addressed appropriately to be able to  
22 encourage the market. So if you're at home, you have access to

1 it. And if you live in an apartment maybe you're relying more  
2 on the workplace or you're relying more on the public side of  
3 things. And if you're commuting longer, then you have sort of  
4 reliable points in between.

5                   And so we really do need to think about this  
6 as a holistic ecosystem for charging that layers things on  
7 managed charging and vehicle grid integration overall. So  
8 these vehicles become assets to the grid and not hindering  
9 points, which all of the evidence points to that they can be.  
10 Plugging in when you need to plug in versus plugging in when  
11 it's beneficial to the grid won't make sense. And there's ways  
12 and mechanisms to ensure that that value is there.

13                   And so what's our role? What's General  
14 Motor's role? What's my job? What's my team's job? To give  
15 you some sense of it it's really, at home make it easier, make  
16 it seamless, make it encouraging. You know, those us who still  
17 have cable boxes -- I'm dating myself a little bit -- but it's  
18 easy. You get a cable box, and you forget about. Right?  
19 That's -- I'll say the mentality -- I don't know if it's the  
20 way we need to do it; but that's the type of mentality of how  
21 do we get charging inside of the people homes. And GM really  
22 is thinking about what are the types of partnerships and

1 relationships that we have to encourage that -- Humara  
2 (phonetic) is one of them -- to really create a seamless -- I  
3 won't get into the details right now.

4                   Workplace; dealing with workplace charging  
5 challenges. It's now sort of not there, but for those of us  
6 who are around such a critical piece of vehicle adoption,  
7 right, in places like California where there is an over  
8 abundance and they're curtailing renewables in the middle of  
9 the day, we need those cars plugged in to gobble up that solar.  
10 Right? It can be a really important asset. If you don't have  
11 charging in your apartment, awesome, right? Now I've got one  
12 really good firm place that I know I can charge. How do you  
13 put the right programs in place to really encourage those sorts  
14 of things.

15                   So GM is, A, the leader in this space; and  
16 then, B, we need to really think about how do we encourage the  
17 right programs, the right employers to participate. More to  
18 come on that in the coming months for GM. Another one equally  
19 as important is what's General Motor's role in sort of a public  
20 space. We certainly, to address the elephant in the room,  
21 we've be accused of not participating in public development of  
22 public infrastructure as much as we could. I would argue that

1 we've been very active self in trying to put in the right  
2 partnerships, but earlier last year, in May or so, we came out  
3 and made an announcement that we're working on a collaboration  
4 with Bachtel -- Bachtel is the largest construction firm in the  
5 country -- to really think about how would we create the  
6 installation of thousands of additional public charging  
7 stations in the ground.

8                   And so while I can't talk much about it right  
9 now because we're in the middle of putting that recipe  
10 together, I can tell you that it's a very important piece of  
11 leverage in general, our scale, our data, our knowledge, and  
12 our ability to put cars in the right places to get it charging  
13 when they should be charging together.

14                   And then also, you know, simple things about  
15 making it more seamless. So those who have a Bolt you might  
16 know you have an app from My Chevy. Within that app there's a  
17 feature called My Energy Assist. That energy assist feature is  
18 a way finding feature, but it also does other things, allowing  
19 you to essentially allow multiple charging station providers in  
20 the single app create start stop, for example, payment schemes,  
21 those sorts of things are very important. Again, I liken these  
22 things to sort of push button start. And those who don't have

1 push button start I'm sorry. Those who have push button start  
2 and you get a key, you're like why do I have a key. Right?  
3 Like, this is so annoying. If you go back. But when you get  
4 push button start, it becomes, like, man, "This is the new  
5 normal". And we need to have EVs fit into our lives in that  
6 normal.

7                   And to the point about education opportunity,  
8 we have to be able to let people know, like, "How long does it  
9 take to charge?" 10 seconds. Get out and plug it in. Right?  
10 That's the new norm that we have to start to bring in. We have  
11 to bring features like the Energy Assist app where it's so  
12 seamless. You don't have to think about it. You plug it in  
13 and you walk away from it. And it really starts to get at  
14 people's heart strings. And this is just better, right,  
15 driving an EV. And most of us driving an EV believe that that  
16 experience needs to translate more into the masses. And think  
17 of what we're working on -- a lot of what I'm charged with is  
18 really around that piece of the puzzle.

19                   Again, I thank you. I apologize for the  
20 voice. I really do appreciate the opportunity here, and I look  
21 forward to questions. Thank you.

22                   MS. KATE TOMFORD: Good afternoon. I'm Kate Tomford with

1 CTA. Again, I want to thank the Commission and particularly  
2 Commissioner Bocanegra and her staff for the invitation today.  
3 Also, I wanted to play off of Alex's metaphor with the recipe.  
4 We have a lot of ingredients here in Chicago and many of them  
5 are in the room. So I wanted to say thank you to all of our  
6 CTA partners for being a part of this CTA electrification  
7 effort. We certainly couldn't do what we've done and what we  
8 hope to accomplish without all of your support; so thank you.

9                   Also just excited to provide some perspective  
10 on heavy duty electrification because it's a little bit  
11 different in some respects, particularly in the transit realm  
12 in comparison to the regular passenger market. For context, we  
13 are one of many cities around the country now that have set  
14 targets for full transit bus electrification. You can see  
15 we're here in the middle of the country. Our major cities and  
16 transit agencies along the coast have also set goals. And this  
17 is by no means an exhaustive map. There are many other  
18 agencies around the country that have done this, many smaller  
19 than us and other large agencies too.

20                   Just to highlight, the entire state of  
21 California has a goal by 2040. That's 14,000 buses. For a  
22 comparison, here in Chicago we have 1,860 buses in our fleet.

1 Our goal is also 2040. Some are articulated as zero emissions.  
2 Some are electric buses. Ours happens to be electric buses.  
3 We, basically, have 20 years to get there.

4                   Also, I'm going to talk today a little bit  
5 about how we're progressing so far and what we plan to do.  
6 So far we have two electric buses that have been operating in  
7 our fleet now for over 5 years. They were introduced at the  
8 end of 2014. They're all electric new fire buses. We recently  
9 sent them back to Winnipeg to get retrofitted. They're now  
10 back in operation in our fleet. They were originally charging  
11 in our garages, and now we're going to have the capability to  
12 charge them on an overhead faster charger.

13                   So these have been sort of our test buses.  
14 Although, they have been in revenue service this whole time.  
15 So people see them out on the street and then ride it likes  
16 it's any other normal CTA bus. These buses, as I said, started  
17 off having just depot charging so they were operating on a  
18 number of different routes around the city. They are going to  
19 be going back into service in the next few months and using a  
20 high-powered overhead charger at our midway terminal. That's  
21 where you connect. You get out of the plane at Midway or take  
22 the Orange Line to the end of Midway Station there and you

1 transfer to a bus. You'll see the charger there.

2 Under construction now we are also in the  
3 middle of a contract with Proterra (phonetic) for another  
4 tranche of buses. We entered this contract in 2018, and we're  
5 in the process of getting a delivery of the buses now. We got  
6 five of them last month, which was very exciting. We're  
7 getting 6 next month, so that will be our first order of 6  
8 buses. Then the remaining of that base order up to 20 buses is  
9 coming over the course of the next year.

10 By the end of 2020, early 2021, we should have  
11 about 25 electric buses and fleets. The Proterras are also  
12 going to be using an on-route overhead high-powered charger.  
13 It's going to be -- they're going to be operating on our  
14 Chicago route, which is a 27 -- 24/7 route that runs around the  
15 clock. It's about a 10-mile route, and the buses just go back  
16 and forth on that east-west route, charging at either end of  
17 the route.

18 I was very impressed to see this press release  
19 come out from New York City's MTA in December. They have a  
20 capital bill -- a capital plan, rather. I'm in the Finance  
21 Department of the CTA, so we spend a lot time in the fourth  
22 quarter putting together our the budget plans. The capital

1 plan is a 5-year plan. And they have included in their capital  
2 plan \$1.1 billion dollars to go toward fleet electrification.  
3 They have bigger fleet than we do; but this is specifically for  
4 500 buses, and the associated upgrades that they'll need to  
5 make to depots in order to have those buses charging at depots.

6                   What impress me about this is that the cost of  
7 electric bus is running just under a million dollars a bus,  
8 around 900,000 or so in our contract. So you can estimate 500  
9 million of that 1.1 billion is going to buses. The entire  
10 remainder is going to infrastructure; and that's similar to  
11 what we're seeing here in Chicago is that there's a really a  
12 high cost for the investment in infrastructure.

13                   They also have this goal, when it's mentioned,  
14 of Sony buying electric buses starting in 2029. That's also  
15 something that we're putting a lot of thought toward, because  
16 transit buses have a life time of around 15 years. So to get a  
17 2040 target we have to be buying electric buses, only electric  
18 buses, starting in 2025.

19                   So one of the key concentrations, as I  
20 mentioned, is the infrastructure. These are some examples of  
21 infrastructure around the world. Just going clockwise, in the  
22 upper left corner that's a depot that's been entirely converted

1 to electric buses in London. The upper right-hand corner is in  
2 L.A. That's an on-route station where passengers can board on  
3 the light while buses start getting overhead chargers.

4 On the lower right is a demo project at the  
5 Dimo Chrysler (phonetic) plant in Germany. As you can see,  
6 they have all the switch gears, transformers up on that deck  
7 above the chargers, and the charges are overhead Panorex  
8 (phonetic), again, charging buses as they pull in to park for  
9 overnight charging.

10 And then on the left photo that one of my  
11 colleagues in our engineering department took of an example in  
12 the Netherlands, again, sort of an overhead Panorex system with  
13 a drop-down Panorex that's contacted within the bus, and it  
14 could be in a parking lot or a depot like that.

15 We're trying to figure out what our  
16 infrastructure is going to look like and what's the most cost  
17 effective way to install it. And considerations go beyond  
18 putting in this specific equipment. We have the equipment  
19 itself and the physical structure that's supporting chargers.  
20 We also have all of the electrical upgrades that need to be  
21 made in order to bring the service to the site of the charger.  
22 We've been working very closely with ComEd to understand what

1 that will look like and what the associated costs might be.

2                   Again, as just a background and context, CTA  
3 has seven bus garages, so our 1800 buses are distributed  
4 amongst those, 250 buses per garage, give or take. And each  
5 garage currently has 1 or 2 megawatts of service. We think  
6 we'll need at least 10 megawatts of service, perhaps 15  
7 megawatts of service if we're charging at those depots with  
8 most of our buses overnight. We want to do some charge  
9 management of course to hopefully lower that peak, but it is a  
10 hug increase for us across our side and then of course on  
11 ComEd's side as well.

12                   In addition, we have the fact that our  
13 facilities are very old and in many cases outdated. They're  
14 hundred year old buildings, so they are not into what we call  
15 in transit industry's state of good repair. We make a lot of  
16 upgrades just to get them to a current state of good  
17 functioning. And if we go and convert them all to electric bus  
18 depots, electric buses will be associated with the costs. And  
19 it's not that they're necessarily -- those upgrades are not  
20 necessarily because of electric buses. They just need to be  
21 made anyway. But if we're going to go through the trouble of  
22 making the upgrades, we're going to make it with those

1 additional costs.

2 Another consideration is that our current  
3 seven garages are over capacity. So if we're going to start  
4 doing all of this construction to upgrade our transit and our  
5 charging infrastructure, then where are we going to house our  
6 buses in the meantime? There's a big looming question of  
7 whether we should have or need a garage that just serves as the  
8 overflow for all of this shuffling around. So all of those  
9 things add up to a lot of costs.

10 I want to just talk a little bit about a study  
11 that we're doing right now so we can try to understand what  
12 this electrification pathway might look like over the last 20  
13 years. We were fortunate to receive some funding from the  
14 Joyce Foundation (phonetic) and we're working with our partner  
15 Sammy Schwartz (phonetic). Some of you might be familiar with  
16 our transit leasing partner who is helping us do some of the  
17 modeling from and the study.

18 We have three initial parts of the study.  
19 One is underway right now. We're taking all of our data on the  
20 current bus schedule, where all of the buses run, the routes  
21 that they run, the schedules that they follow, and what we call  
22 vehicle watts, the mileage that a bus runs from the time it

1 leaves the garage to when it returns to the garage. And we're  
2 seeing whether all of that scheduled data can be accommodated  
3 with current technology, a moderate improvement in technology,  
4 or a significant improvement in technology, whether the buses  
5 are charging at depots or if they need to charge somewhere.  
6 So, basically, we're seeing how bus services and schedules  
7 match up against technology.

8                   The second piece of this is understanding the  
9 upgrades that our facilities will need in order to be  
10 accommodate depot charging, also potentially on route charging,  
11 too -- a mix. And then we have the third elements of this  
12 that's an equity analysis. We're working with some data from  
13 the Chicago Department of Public Health to understand how the  
14 benefits of electric buses will be distributed or could be  
15 distributed optimally around the city in terms of health  
16 impacts especially. And our first panel, I think it was Nick  
17 who mentioned the local air qualities of benefits -- it was  
18 Dan. Dan mentioned the local air quality benefits, and that's  
19 something that we're paying particular attention to, in terms  
20 of effective populations here in Chicago.

21                   All of these first three analysis will inform  
22 our development of scenarios for the pathway to actually

1 replace our full diesel buses and by new electric buses and  
2 make those investments upgrading the garages, whether we do all  
3 of that in the first 5 years or we wait and we're do more of it  
4 in 2030 decade. I'm trying to figure out what that sequencing  
5 will look like -- where, when, and how the buses will be  
6 converted. And then once we have the scenarios in place we're  
7 going to model them with cost analysis to compare them against  
8 each other, essentially, in terms of costs.

9 All of this is happening over the next 6  
10 months, so we hope by the end of the second quarter we should  
11 have some data that we can share with everyone. And we do plan  
12 to publish a report. It'll be on our web site, so we hope  
13 everyone checks back in with that.

14 Lastly, I just want to emphasize that there  
15 are many other considerations that CTA has that overlay with  
16 our process of electrification. Our bus ridership has been  
17 declining over the last several years. I think the peak was in  
18 2012. And we're seeing declines much like many other urban  
19 areas across the country.

20 So do we have to electrify 1800 buses? Maybe  
21 we only have to electrify 1500, and that will be sufficient for  
22 bus service in 2040. There's a question of autonomous vehicles

1 and how that will overlay with electrification. We don't  
2 really know. I will say one thing to our benefit is that we've  
3 been running an electric rail system for a hundred years, so we  
4 have a lot of experience, and we hope to translate a lot of  
5 that to our electric bus program as we go forward.

6 It's a very exciting time to be at CTA. Look  
7 out for the electric buses as they roll out in the next few  
8 months. And I'm glad to hear, and I'm glad to take questions  
9 and comments. Thank you.

10 MR. PHIL JONES: My name is Phillips Jones. I'm the  
11 Executive Director of the Alliance for Transportation for  
12 Electrification. I'm a former regulator, and I'm here to help  
13 the Commissioners today. So just a little background on me. I  
14 served 12 years as Commissioner in Washington State, served as  
15 president of NARUC. I served on the board of NRRI (phonetic),  
16 one of the research institutes for the regulators. And I  
17 currently served with Commissioner Oliva on the Emery Advisory  
18 Council (phonetic) and some other issues.

19 I've had a long-standing interest in  
20 technology, how to set just and reasonable rates, how to  
21 incorporate those things into the grid. And so when I retired  
22 from the Commission 2 years ago, I had an opportunity do this

1 work, and I jumped at it. This is a very exciting time. I  
2 think both panelists have said it here. We are at a have -- I  
3 don't know if you'd call it a tipping point, a crossroads. It  
4 may happen in bumps. It may not be a smooth road, but we are  
5 undergoing a fundamental transformation in three industries in  
6 this country: information technologies; namely, software and  
7 energy systems, the automotive industry that Alex represents  
8 and also your industry in transit and then the electric power  
9 industry.

10 So how we do this over the next 5, 10, 15  
11 years is really, really important. We can really do it well,  
12 but we can really mess it up, too. And by messing it up I mean  
13 we don't encourage consumers to charge off-peak. They come  
14 home and charge all at the same time; pay high rates. We have  
15 to buy more gas fire papers for energy and capacity to fill  
16 that need.

17 Voltage authorities, cyber security, all of  
18 these network management systems can be hacked. All right?  
19 Software; we see what's going on in the world today. So as  
20 Alex said, this is tough work. This is going to take a lot of  
21 attention. We're all really focused on this, but I just want  
22 to start with a note of caution that this is -- as Alex said,

1 it's not a sprint. It's a marathon.

2                   So I'm also a pitch hitter today. You were  
3 supposed to hear from Jim Thomas of Rivian (phonetic). Rivian  
4 is another member of my alliance. My alliance consists of  
5 utilities, auto OEMs. And, full disclosure, General Motors is  
6 on my board. Alex was on my board at General Motors when  
7 Britta was there, who was a founder member of the alliance.  
8 And then we have certain -- not all, but certain of the  
9 infrastructure.

10                   So what we try to do is take a holistic  
11 approach towards infrastructure. We're totally focused on  
12 infrastructure. We are not so much focused adoption.  
13 Although, adoption comes in. But we're really focused on how  
14 to build out a robust infrastructure for EV charging that is  
15 interoperable, affordable, is not subject to technological  
16 lessons, and has a very strong utility role.

17                   Just remember that the fuel for the vehicles  
18 of the future is kilowatt hours. It's not gasoline. It's not  
19 diesel. It's not propane. It's kilowatt hours. So who makes  
20 the kilowatt hours? The utilities. Who transmits them to the  
21 road? The utilities do. So that's why the Commission --  
22 that's why you all in the Commission are in a very key position

1 right now along with the utilities.

2 I'm going to focus in my few minutes just on  
3 medium and heavy-duty cases. What we call medium and heavy  
4 duty, this is anything from a Class 2 to a Class A truck and  
5 Metra transit buses, school buses, what Rivian makes, a  
6 light-duty truck. They also are introducing a crossover SUV  
7 from their plant to Normal, Illinois that will start producing  
8 this year down state. I'm going to talk a little by the about  
9 the regulatory issues and a little bit about the path forward.

10 So why is this happening now? This is a very  
11 hot topic in the industry. I think one of the reasons -- and  
12 the first panel discussed this, too -- is that the focus of a  
13 fleet manager is very sharp on things like making it work,  
14 delivering products, delivering people for CTA.

15 For a light-duty vehicle it's more of a  
16 personal decision to purchase a vehicle over the last 12 years.  
17 You're going to drive it with your family and safety.  
18 Obviously, all of those things are important, but for fleets  
19 it's really more of a business decision; and we have business  
20 model issues that we have to discuss as well.  
21 Battery costs are coming down, as Nick and Alex said and  
22 Britta. But also we have environmental factors. In

1 California -- you don't have this in Illinois, but in certain  
2 states there are very strong environmental Commission  
3 restrictions and things like that. Metra Transit has -- she  
4 just talked about this. Metra Transit agencies, not all of  
5 them, but Metra Transit agencies are getting very interested in  
6 that. Some of their elected officials are first to go all  
7 electric.

8 Utility filings. A lot of the utilities that  
9 I represent are filing all across the country. Nick put up a  
10 slide, and we have something to do with that of course. We  
11 encourage the utilities to have good filings. Many of these  
12 utilities just in the last year or so are including school bus  
13 and Metra Transit bus programs. Usually with a rebate, a  
14 pretty substantial rebate that you all will have to approve as  
15 Commissioners, but those filings are coming forward.

16 The VW settlement, as Nick said, is an  
17 important source of leverage. But just to put this in context  
18 for the Commissioners, there are other sources of funding here.  
19 So the utilities' funding I think is really important, but don't  
20 forget about the private sources of funding as well. There is  
21 going to be a mix. Alex just talked about a possible -- it's  
22 not done yet -- a possible venture between GM and Bechtal.

1 Obviously companies like Charge Point, EVO are raising money in  
2 the private equity and other markets. And Rivian, who's not  
3 here today -- Rivian has raised \$2.9 billion dollars -- that's  
4 billion.

5                   So there's big money. Is this a lot of money  
6 given the scale of the transformation over 30 years? No. This  
7 is going to take hundreds of billions of billions of dollars.  
8 So this -- as my friends a Rivian will say, this is just a  
9 start. That 2.9 billion that's going into your state of  
10 Illinois is just kind of a down payment, at least in Illinois.

11                   So on Rivian, I'm not going to steal Jim  
12 Thompson's thunder. You can talk to him about the  
13 announcement. You all read about it, a thousand delivery  
14 trucks for Amazon. Amazon is in my hometown of Seattle, so  
15 people in Seattle are pretty jazzed up about this, too. A lot  
16 of details have to be worked out. Obviously Rivian is first  
17 coming up with those two vehicles I mentioned, so this Class 4  
18 delivery truck is under development as we speak.

19                   Rivian is not the only one. Dimland  
20 (phonetic), in Portland; Volvo trucks; UPS; FedEx and there are  
21 many others that have been working very hard in the medium and  
22 heavy-duty space; so stay tuned about that.

1                   In terms of utilities that are doing a good  
2 job across the country, I'll just mention a few. Southern  
3 California Edison has a very big medium heavy-duty program  
4 approved by the Commission. San Diego gas and electric has a  
5 very big program, \$109 million dollars that covers drains as  
6 well as medium and heavy-duty equipment. As well, PGNE  
7 (phonetic) up in the Bay area is having financial issues now,  
8 but they are proceeding with their ED program. And they are  
9 very active in the space, and they have a very innovative --  
10 I'm going to talk briefly -- not in the weeds. I'm going to  
11 talk briefly about rate design. But they have a very  
12 interesting program called CEV, the Commercial EV rate, and  
13 it's a subscription rate.

14                   So they try to estimate the daily load occurs  
15 and the vehicle and the load. They look at the building  
16 determinants and, they came up with kind of a monthly  
17 subscription plan for the customer rather than going through  
18 volume metric, and demand charges, and things like this. So you  
19 may want to take a look at that.

20                   Excel Energy in Minnesota had some very good  
21 programs in in Colorado. Minnesota Excel Energy, helping  
22 service Colorado just approved kind of a very innovative --

1 it's like a CBD rated critical rate for RTD (phonetic), the  
2 local Metra transit agencies, because when they roll out their  
3 buses, they were paying far too much in demand charges. So  
4 Excel responded to that. There was a multi-party settlement  
5 approved by the Commission.

6 Duke Energy has filings pending in North  
7 Carolina and South Carolina with very good school bus and Metra  
8 Transit programs not approved by those Commission yet. And of  
9 course Exelon has some very good programs in Maryland, DC, and  
10 New Jersey. Some are pending. Some of it approved.

11 A little bit about infrastructure for medium  
12 and heavy-duty. It's different. As Kate was talking about,  
13 for bus charging you're talking about two types of charging;  
14 right? So one is equal charging overnight, and one is this  
15 panotgraph, P-A-N-T-O-G-R-A-P-H, charging, which is higher  
16 voltage and more end routes, faster. So for quite a while the  
17 bus fleets and the commercial fleets were, like, depot  
18 charging. But, as Kate mentioned, CTA, Kane County Metro, many  
19 of the Metro Transit Agencies around the country are moving  
20 toward a mix of depot charging and more overhead charging.

21 Interoperability and standards. I urge you to  
22 take a look at this on the bus industry. I think it's done a

1 good job or the heavy-duty industry, coming around common plug  
2 standard. For those of you who don't know there are three  
3 plugs, transit plugs, that are not consistent with each other.  
4 For light-duty vehicles you have Tesla plug; you have a Chibole  
5 plug; you have a Fleece plug; and you have what is called a  
6 J1772 (phonetic) plug or what is called the CCS combo  
7 (phonetic).

8                   The Metra Transit Agency, or the bus makers,  
9 are coming around that standard of the J1772 plug, which is  
10 good. So there's one or two exceptions to that. But I would  
11 argue that if you were using ratepayer funding to fund some  
12 these transit and school bus programs, you should work with  
13 your staff, work with the utility to ensure that these programs  
14 are as interoperable as possible.

15                   On the back end, it's a little more difficult  
16 for the communications brought about between the cloud and  
17 charging. There's a standard called OCPP, Open Charging Point  
18 Protocol. Many of the bus and auto makers are coming around on  
19 that, but there's still more to be told on that. I would just  
20 urge you to take a look at the protocols and the standards.

21                   The other thing that you need to take a look  
22 at these extreme charging loads that Kate just talked about.

1 These are not small loads on the system. So whether it was  
2 ComEd, or Ameren, or Mooney (phonetic), or whomever here in  
3 Illinois, when you're talking about adding one or two megawatts  
4 to a neighborhood where the substations is weak or the feeder  
5 is not accurate, you need to be looking at that. So you don't  
6 want to be introducing voltages abilities and problems with  
7 substations. So this is something where planning, whether it's  
8 integrated resource planning or whatever planning you do with a  
9 PJM contract like you have in your state at least in the North.  
10 Ameren is different in the South of course; but you should pay  
11 attention to the planning issues. Many commissions across the  
12 country are requiring the utilities to do comprehensive TE  
13 plans, what we call comprehensive transportation  
14 electrification plans.

15                   Rate design issues. I'm not going to get into  
16 rate design. We will -- you know staff, Commission Bocanegra,  
17 if you need examples of different rate designs for medium,  
18 heavy-duty, light-duty across the country we have a ton of  
19 those. We can help you out with that.

20                   So I really applaud Commissioner Bocanegra for  
21 taking this initiative today, for directing the NARUC task  
22 force on EVs, some of the leading -- and you have already been

1 out there talking to them, I think, Commissioner -- but  
2 Minnesota is a real leader in this. I would urge you to look  
3 at what they've done to excel on medium and heavy-duty  
4 vehicles. California is a leader. We've talked about that  
5 today. Many of the panelists, the CUDC (phonetic) -- not just  
6 the CUDC -- The Oregon CUDC has done a lot. They've done  
7 things with Trimet (phonetic), the Metra transit agency.  
8 They've done some interesting low income issues too for  
9 rebates, but they really encourage affordability and access in  
10 a variety of ways.

11 The Maryland PSC has some integrative  
12 programs. And, finally, as I said, Maryland. And I think  
13 Commissioner Stanek -- if I understand, Commissioner Stanek is  
14 the co-chair of the NARUC. So there's a good group of  
15 Commissions and Commissioners that you can refer to as you go  
16 forward with this work. This medium and heavy-duty work  
17 requires a separate workshop or maybe a separate session. The  
18 issues involved are quite different than the light-duty side,  
19 so that's something that you may want to consider. So thank  
20 you. I look forward to your questions.

21 COMMISSION MODERATOR: Thank you everybody. That was  
22 wonderful. We are going to have time for just one question.

1 We want to keep everybody on time and out of here by 4:00 or  
2 5:00. We will go seamlessly into the next panel. Please stay  
3 in your seats. But if you do have to use the rest room, by all  
4 means do so if you need to.

5 So who has a question?

6 MR. H.G. CHISSELL: Good afternoon. My name is HG  
7 Chissell, founder and CEO of Advance Energy Group and Director  
8 of AG Chicago.

9 My question is -- we focused on  
10 electrification, but there is another focus, which is  
11 decarbonization. And when you have cities that make a  
12 commitment to be decarbonized by 2050, how do you see the best  
13 path to reconcile the commitments and aspirations of, say, GM  
14 to provide electric vehicles and proliferate those with a need  
15 to maximize the value of mass transit.

16 There somehow needs to be a reckoning where  
17 they can come together and create the best outcomes for our  
18 city that's committed to being carbon free in 2050. I'm  
19 interested to hear your thoughts on how best to spread that  
20 needle.

21 MR. ALEXANDER KEROS: Yeah, real quick. I'm actually on  
22 the technical advisory committee for the city of Ann Arbor.

1 It's looking at this. And, obviously, decarbonization is  
2 pretty broad; right? You have to think about everything from  
3 buildings, and facilities, all wooded transportation.

4 The other hat I did wear was I was Mavin  
5 (phonetic) smart city's chiefs. For those of you who know  
6 Mavin was GM's start-up around mobility and really rethinking  
7 how our relationship with automobiles as well as what are the  
8 opportunities for everything from walking and biking to taking  
9 mass transit.

10 My personal belief -- and I think we  
11 understand this -- is transit has to be the backbone of pretty  
12 much any urban transportation planning system. And how then  
13 all of these additional mobility factors are to integrate  
14 within that transit system, whether it's a shared vehicle,  
15 whether it's walking or biking and shared, you know, two-wheel  
16 vehicles, all of the way to personal vehicles, I am a believer  
17 that -- well, that's the backbone and why we have to do it. We  
18 have to think about thoughtfully investing in those things so  
19 people want to get into them as we move forward.

20 In my mind there's a lot to do there, to be  
21 honest, and a lot to figure out how to reconcile them; but I  
22 don't think on the surface that there's necessarily -- for

1 example, GM is sort of anti-mass transit or at least bumping  
2 heads with a CTA. We have to actually sit down. I will admit  
3 that GM has been out of the transportation playing discussions  
4 for a very long time. And GM needs to be more involved to make  
5 sure that our products, and our systems, and services fit well  
6 into that type of model.

7 MS. KATE TOMFORD: It's really an existential question  
8 for CTA. Our buses that are not full are completely -- I  
9 mean, today with diesel buses I think that the break point is  
10 something around 80 passengers. But if you have 80 passengers  
11 or fewer, then you'd be better off just having people in same  
12 walking distance of vehicles from the Commission's standpoint.  
13 So don't quote me on that number, but I've seen it out there.

14 For us it's a question that we have to tackle  
15 simultaneously. And we have many studies looking now at  
16 mobility in a Chicago region and how that's going to be  
17 transformed in the next decades. And we've seen a lot of  
18 interest in it and actually movement in it.

19 CTA now has infrastructure projects that are  
20 funded by the additional fee imposed on ride share vehicles  
21 here. And that's gone up again now 2020 significantly. So  
22 we're looking at ways that we can draw people toward transit

1 because it is a low carbon form of transportation and mobility;  
2 but it's part of this fabric with all of the other loads that  
3 Alex mentioned. If we can electrify our component of it, that  
4 obviously helps, but no one's taking our vehicles. There's  
5 really no point. So it's a multi-pronged challenge and one  
6 that we're looking at with many of our stakeholders to try to  
7 address the point.

8 COMMISSION MODERATOR: I'm going to cut in so we can go  
9 to our next panel. But I want thank Alex and Phil.

10 (Applause.)

11 COMMISSION MODERATOR: At the end of today you will have  
12 an opportunity to ask questions afterwards, so please write  
13 them down or jot them down. Thank you.

14 COMMISSIONER BOCANEGRA: Okay. Everybody, while we're  
15 doing the transition I'm going to go ahead and start  
16 introducing the names of our next speakers. The final panel is  
17 considering how EVs promote carbon equity, grid resilience and  
18 development of the future workforce how EV to promote  
19 resilience and development in our future workforce.

20 So the first individual we have up today is  
21 Dr. Elizabeth Kocs. She works with NREL, is the Executive  
22 Energy Leader in 2019 and Director Of Partnerships And

1 Strategies at the UIC energy initiative. Second, we have  
2 Christie Hicks. She is senior attorney at the Environmental  
3 Defense Fund.

4 We also are pleased to introduce Tim Drea who  
5 is the newly-elected president of the AFL-CIO here. And last  
6 but not least we have Mr. Mike Raikes. He is the business  
7 manager and financial secretary for IBEW Local 197. So we hope  
8 to give you a quick perspective of these different industries;  
9 and without further ado I'll turn it over to Elizabeth. Thank  
10 you.

11 DR. ELIZABETH KOCS: Good afternoon, everyone. I would  
12 like to thank Commissioner Bocanegra and her staff for the  
13 opportunity to talk about EVs today at today's EV Policy  
14 Session. Thank you also for the introduction and to where  
15 multiple hats. My main location is UIC's energy initiative. I  
16 have been participating in NREL's Energy's Equity Program and  
17 I'm also co-founder Center for Environmental Sustainability,  
18 which is the University of Illinois System.

19 So the question is why EVs? Why should we  
20 plan for them? Well, the best component options to focus on is  
21 opportunities across five areas and the need to consider EVUs,  
22 which is not just EVs, but also charging infrastructure for

1    them as partners with the grid.  So EVs offer opportunities  
2    between grid and transportation industries.  They are also  
3    allies for the environment of both targets, as we just talked  
4    about the previous panel.

5                    They're also leaders when comes to economic  
6    value stacking.  EVUs support nuclear energy job sectors, and  
7    the economy.  They're also nexuses for consumer needs, the  
8    appeals of EVs and consumer adoption.  They are also connectors  
9    across benefits for society.  So EVs provide social, health,  
10   and equity benefits for humanity.

11                   So I'm going to highlight some data from  
12   different sources that supports this framework.  The first one  
13   is grid partnerships.  So EV's electric make partners.  Why?  
14   Transportation electrification is subjected to electricity  
15   demand.  The figure on the left indicates total energy use for  
16   each sector in the U.S.  The yellow outlined area indicates  
17   subsectors that do not use electric energy as a primary source,  
18   which is the larger section to the top and on the left.

19                   Underneath that is both subsectors that  
20   actually use electricity.  In the oval, red oval, it  
21   demonstrates the opportunity for electrification of over 50  
22   percent of transportation sectors who from like medium-duty

1 vehicles. We've heard from both panels the importance of  
2 light-duty vehicles but also medium as well. And there's  
3 another 25 percent of freight trucking that we go beyond. The  
4 greatest impact is for light-duty cars and trucks with vehicle  
5 miles traveled, fuel use, and emissions.

6 They also have lower technological hurdles due  
7 to battery costs, density challenges and charging  
8 infrastructure. Transit buses, school buses both have been  
9 mentioned and they are prime candidates for electrification as  
10 battery and electrical vehicle costs continue to decline.

11 The figure on the right provides estimates on  
12 annual electricity consumption for three different adoption  
13 levels and compared these historical data. Wide spread  
14 electrification requires accelerated EV sales that are well  
15 beyond current levels. In the high scenario U.S. on-road  
16 transportation fleet is estimated to improve 240 million  
17 light-duty EVs, 7 million medium and heavy-duty plug-in  
18 electric trucks. 80,000 battery electric transit buses that are  
19 delivering up to 76 percent of vehicle miles traveled from  
20 electricity in 2050.

21 Electrification has the potential both to  
22 significantly increase overall demand for electricity and to

1 lead to historical unprecedented growth. The vast majority of  
2 this increase occurs in the transportation sector. From a  
3 partnering perspective let's look at revenue and overgrowth  
4 planning. The top left figure shows average PEV in Illinois.  
5 2030 is projected to increase utility revenue by over \$400 over  
6 its lifetime and 250 full EVs and service in 2050. This is  
7 assuming it's in your life and charging off-peak.

8                   The bottom left figure estimates the project  
9 utility -- the projected utility revenue costs and that revenue  
10 for off-peak charge on different scenarios. There's two  
11 different ones. There's moderate and a high. Under moderate  
12 initiatives, off-peak charging will increase the MPV of annual  
13 utility net revenue by 23 million in 2030 and 46 million in  
14 2050. For the high definition off-peak charging increases it  
15 to by       30 million -- 39 million in 2030 and 147 million in  
16 2050.

17                   When we think about EVs they are expected for  
18 Illinois to account for 3 to 10 percent of total electricity  
19 use by 2050. The interesting thing is there's also flexible  
20 loads that can be leveraged. So deploying instruction  
21 strategies, which is what we mentioned previously, incentives  
22 charging vehicles off peak. Now, this is out of state

1 utilities and customers since there's they excess electricity  
2 and capacity which can now be sold while making a more  
3 efficient use of the existing grid.

4 Additional revenue from these efficiencies can  
5 be used to offset the grid additional load and EV charging.  
6 Establishing the figures on right for you are highlighting the  
7 opportunities with the grid, and also the bottom one is for  
8 planning for EV load growth. I'm aware there's some  
9 opportunities establishing connecting managed charging programs  
10 that incentives customers to charge during off-peak hours. So  
11 just providing managed charging is simply not enough, but  
12 connecting it to vehicle where it makes it easier for the  
13 consumer, provides additional incentive and information.

14 Charging Behavior, this is something that I  
15 think Phil was mentioning, somebody who said that they were not  
16 a psychologist. I'm not sure who that was. That was Dan. So  
17 charging behavior can have a significant impact on environment,  
18 and pairing it with charging -- charging -- I'm sorry. Pairing  
19 charging with excess capacity provides environmental benefits  
20 from increased renewable generation usage unless peak  
21 generation. So I'll be coming to -- I'll be talking about human  
22 behavior a little bit here and later on as well.

1                   I am actually a human computer scientist, so  
2 this does fit under my purview. The left figure shows the  
3 effect of PEV charging on Illinois's electric grid under two  
4 different types of scenarios. The top one shows a load from  
5 8:00 and 11:00 p.m. and charging peak system, afternoon peak.  
6 The bottom one is off-peak charging where it significantly  
7 reduces charging during afternoon peak load and creates a  
8 secondary peak during midnight to 3:00 a.m.

9                   Off peak charging incentives can help early  
10 morning peak, which is why the generation is high. The figures  
11 on the right. Efficient charging actually goes beyond just  
12 managing off-peak charging. First you want to gain  
13 efficiencies by purposely planning and building a charging  
14 network to less embody the infrastructure costs per vehicle.  
15 This is being more environmentally responsible.

16                   Many cars benefit from one public charging  
17 station. So if we think about the current model where everyone  
18 has their own charging station at home, that means that for  
19 every EV you have to plan for one charging station there's  
20 opportunities for Level 2 and Level 3 charging stations that  
21 create multiple for the environment.

22                   Level 2 charges tend to be more efficient as

1 well. They should also meet Energy Star standards and charger  
2 power levels that reduce energy losses. Those will lead to few  
3 impacts on the environment. In addition to Illinois's current  
4 generation provides opportunity funding charging for EVs. It  
5 is expected for wind to increase 8,000 gigawatt hours per year  
6 between now and 2021. This is an ideal time to pair growth and  
7 renewables with a growing EV charging infrastructure.

8 Additional EV charging loads will be absorbed by renewables  
9 coming online and less reliance on peak or fossil generation.

10 Illinois's nuclear is zero emissions  
11 electricity generation, collect additional added environmental  
12 benefit for charging off based on nuclear. Supporting the  
13 development of an EV ecosystem has a number of economic values  
14 and opportunities. The EV industry is an asset with gas and  
15 vehicle infrastructure providing economic opportunities for  
16 costs in different sectors. You can correlate this to Alex's  
17 story about his son and the growth. It is a massive industry,  
18 and I have teenager, so I know that there's lots of gaps in  
19 their ability to be ready to fly on their own.

20 So the left figure shows current charging  
21 stations in Illinois. It seems like it may be additive, but it  
22 really isn't to support the growing demands and expectations

1 for EV consumers. Closing this gap would require increasing  
2 workplace and public Level 2 charges by seven and three fold,  
3 respectively, and DC fast chargers by three fold.

4 Policies and utility programs to encourage  
5 Level 2 installations and charging for multi-unit dwelling is  
6 critical for the market. Private industry is filling some  
7 strategic charging gaps here, including Tesla, Electrify  
8 America, and several auto companies, departmental charging  
9 providers; but this is still not enough. More actions across  
10 every major U.S. city and state are needed to better match  
11 charging infrastructure with the electric vehicle growth.

12 The figure on the right is actually very hard  
13 to see. I do believe this has been brought up a few times that  
14 shows the number of regulatory dockets by state for EVs and EV  
15 charging infrastructure for the year 2019. There's 53 listed  
16 in that area, in 2019.

17 Upper Midwest states have an issue discussion  
18 with stakeholders and identified pathways forward, as was  
19 mentioned previously about Minnesota, Michigan has also done  
20 some, so there are Midwest states that are taking the lead on  
21 this.

22 Parallel and complimentary government utility

1 involvement is needed as EV sales grow exponentially. And the  
2 focus really needs to be on areas of greatest impact and those  
3 would include developing that work space on revenue streams and  
4 for heightened utilization. So urban areas, fleet, future  
5 electrification subsectors for the future.

6 Utilizing best practices from other cities and  
7 states that support acceleration; support market development  
8 for the most challenges areas as well as disadvantage  
9 communities, transportation borders, and also match your state  
10 planning framework of economic, environmental, and social goals  
11 optimizing existing infrastructure and consumer needs as well.

12 Now we're going to go on to consumer needs.  
13 Why do we need to consider the consumer? Most consumers see  
14 transitions to view technology as challenging because it  
15 requires a change in behavior on their part. Some people are a  
16 little bit more stubborn than others and are resistant to  
17 change. I, myself, see change as good a thing. So  
18 electrification to have the greatest impact a reliable,  
19 affordable, and accessible EV charging infrastructure is  
20 needed.

21 Electric vehicles and battery technology are  
22 here, and they do deliver range. Yes, our consumers expecting

1 more, and for light-duty we are -- the technology is here.  
2 We're actually still using the same technology that was  
3 originally mass commercialized in 1991 by Sony. We are just  
4 simply -- we've found deficiencies in manufacturing and added  
5 information technologies to it to advance its efficiency and  
6 capabilities.

7                   The charging network -- and we've heard this  
8 from numerous speakers on the panel before -- is not quite  
9 there yet. So an extensive EV charging network will alleviate  
10 two consumer adoption charges, access and opportunity. Most EV  
11 chargers -- EV owners charge at home; and this limits consumer  
12 adoption to those individuals that have that ability and have  
13 dedicated parking spaces.

14                   Another hurdle is aligning EV charging with  
15 consumer behaviors. EV charging time is not comparable to ICE  
16 refueling. Technology is getting there, but it's not quite  
17 there. Alex also mentioned this, about charging your phone.  
18 And I think I laughed the loudest out of everyone because I  
19 have numerous different blocks for my phone and different wires  
20 depending on how much time I have to charge it. So opportunity  
21 charging is certainly needed. We have to accommodate that.

22                   And then last but not least, the societal

1 benefits. There is a large societal benefit to EV adoption in  
2 the form of climate change mitigation due to reduced green  
3 house gas emissions. Utilities have gains there. Consumers  
4 have gains there for reduced vehicle operating costs, and then  
5 there's larger additional savings that consumers get, but  
6 society also. The left figure shows me off-peak overnight  
7 negative pricing structure. The benefit here comes from  
8 charging during excess zero emissions generation. The top  
9 right shows the overall benefits, including cost savings to  
10 Illinois drivers, utility customer savings were produced, and  
11 modified benefits of reduced GHE (phonetic) admissions.

12                   The difference between the top on the right is  
13 off-peak is on the top based on charges on the bottom. So the  
14 increased benefits were baseline to off-peak accrue to the  
15 utility customer, the additional reduction in their electric  
16 bill. And those by 2050 are estimated to be over 959 million  
17 and 3 billion for the high.

18                   And I will leave it at that. And thank you  
19 for your time. I look forward to your questions.

20                   MS. CHRISTINE HICKS: Good afternoon, everyone. My name  
21 is Christie Hicks. I'm a senior attorney with Environmental  
22 Defense Fund. EDF is a national nonprofit that uses science,

1 economics, and the law to solve the most challenging  
2 environmental problems of the day. I am based here in Chicago,  
3 and it is a delight to be here. Thank you so much for the  
4 invitation to speak.

5                   It's exciting for me personally to see a lot  
6 of familiar faces but also a lot of new faces here today. I'll  
7 echo what a couple of others have said, and to get to sit on  
8 this side. There's a lot of tape. There's four rolls of tape  
9 back here, and we keep wondering what you all do.

10   (Laughter.)

11                   MS. CHRISTINE HICKS: I'll move on.

12                                   So as Commissioner Bocanegra noted early on,  
13 there has been a lot of progress just in the last year even on  
14 electric vehicles, and electric vehicle policy across the  
15 country. So I'm really glad that we're having this  
16 conversation here today, and we do have a diverse set of  
17 stakeholders because it is going to take a lot of different  
18 perspectives not just to enable electrification but to do it  
19 right.

20                                   And Illinois has been a leader in clean energy  
21 in recent years but it lacking in electric vehicle policy, in  
22 beneficial electrification in particular. Transportation

1 electrification, as you know, presents a remarkable opportunity  
2 to improve the environment to improve health and the  
3 likelihoods, particularly in communities that have historically  
4 been the most energy in climate burdened.

5                   It can decrease local pollution, and there  
6 are a lot of opportunities to bring those communities into the  
7 new clean energy economy. As is often the case, positive  
8 environmental outcomes here can go hand in hand with a  
9 resilient, growing economy.

10                   I'm going to incentives some of the topics  
11 that we talked about already and introduce them once. I'll  
12 start with a little bit of environmental and health information;  
13 then some of the opportunities for regulators, like the  
14 Commissioners, to address and enable; beneficial  
15 electrification with the maximum benefits.

16                   And I really want to emphasize, if there's one  
17 thing that you leave here having heard me say today, it's that  
18 in order to do this right electrification alone is not enough.  
19 We have to be mindful of a lot of different variables here.  
20 From the generation fuel sources to the affordability of the  
21 transition and the impact on those energy and climate for our  
22 communities. So I want to think about not just the "what" but

1 the "how" of electrification, because a comprehensive approach  
2 is what is going to be necessary, particularly to make this  
3 transmission.

4                   Just a little bit of level setting here.  
5 Diesel emissions from trucks and buses, increased cancer risk,  
6 neurological and metabolic diseases can cause respiratory and  
7 cardiovascular damage and are, of course, a major source of  
8 climate pollution. And although emissions from the carbon  
9 sector have been declining, as we know, emission from the  
10 transportation sector are actually increasing and are now the  
11 leading sources of green house gas emission in the country; and  
12 diesel trucks were the leading factor in that increase.

13                   We've talked a lot about light-duty vehicles.  
14 We've also talked some about fleets. Because we can see here  
15 that diesel was one of the primary drivers of an increases in  
16 green house gas emissions in 2018, which is my EDF commission  
17 before last year based on data from a couple of years prior.  
18 After several years of declining green house gas emissions we  
19 saw an increase. That was troubling for a lot of reasons; and  
20 we'll talk about some of things that we can do about that.

21                   What's worse is that low income communities  
22 and communities of colors are bearing the worst impacts of

1 this. They are burdened with a disproportionate share of the  
2 toxic air pollutant; the affordability, or not, the energy  
3 system; and, for a lot of reasons, are a really important part  
4 of the conversation despite the fact that they are not  
5 necessarily vehicle owners themselves.

6                   So I'm going to talk quickly about a case  
7 study that EDF did using the mobile sensor technology in  
8 Oakland, California. We mounted sensors on rural street new  
9 cars. We've used these in a few different contexts. Here  
10 the -- as the Google street view cars mapped Oakland, they were  
11 monitoring for carbon and several nitrous oxides -- I'm  
12 sorry -- nitrogen oxides. And using those sensors EDF found  
13 that residents who took one particular freeway in Oakland were  
14 exposed to concentrations of carbon and/or soot that were 80  
15 percent higher than those located near a different freeway  
16 that, because of policy years prior, doesn't have large diesel  
17 trucks on it.

18                   Even from one end of a block to another  
19 localized air pollutants are actually sometimes vastly  
20 different. Not surprisingly, the more polluted roadway also  
21 produced -- I'm sorry -- 60 percent more nitrogen dioxide, a  
22 lung irritating. Oakland is similar to Chicago in that it's an

1 important logistics (inaudible) region. A lot of  
2 diesel-powered ships, and trucks, and trains go through the  
3 city because the port of Oakland serves both the California  
4 market and then to move products into the markets nationwide.

5 So then EDF layered the health data with the  
6 submissions data, and the results were exactly as you would  
7 expect. For many reasons areas with higher levels of diesel  
8 pollution on this map also had higher rates of  
9 pollution-related diseases and conditions.

10 So we know transportation emissions are  
11 increasing. We know that diesel emissions are a tremendous  
12 threat to health and environment, and we know that medium and  
13 heavy-duty vehicles, because of their diesel nature  
14 disproportionately impact low income communities and  
15 communities of color. So we're today to talk about what can we  
16 do about that.

17 And the good news is there are many avenues for  
18 action from regulators in particular. The rate design charging  
19 infrastructure and number of other things. But as I mentioned,  
20 I want to talk not just about the "what" but the "how" of  
21 electrification so that we do so equitably.

22 As we know the electricity distribution system

1 is built to serve a few hours of highest demand, but that load  
2 could steeply increase with both transportation and bill  
3 electrification. If the system is simply built out further to  
4 accommodate sharp new demand peaks for building transportation  
5 electrification, we've risked it becoming unaffordable. It's  
6 imperative that we do not shift costs to communities that can  
7 at least afford their energy bills at present.

8                   We talked about a few examples of what some  
9 other jurisdictions have been doing. I'm going to highlight  
10 three in particular that are regulatory actions especially; but  
11 of course there's a number of really innovative initiatives,  
12 large and small. In California, as was touched upon earlier,  
13 utilities like Pacific Gas and Electric, or PG & E, are gauging  
14 in low cost infrastructure projects that are aimed specifically  
15 at medium and heavy-duty vehicles, and the utility builds the  
16 necessary infrastructure upgrades from the transformer to the  
17 meter to support new vehicle chargers at the no cost to the  
18 customer under a few specific conditions.

19                   The chargers themselves are also potentially  
20 eligible for several incentives. So the conditions are that,  
21 in exchange, the fleet owners must acquire at least two  
22 electric fleet vehicles. They must provide access to new data

1 about their EV usage for 5 years and they must operate their  
2 charges for at least 10 years.

3                   New York and New Jersey are similarly  
4 investing hundreds of millions of dollars in EV  
5 infrastructures, such as fast chargers along high traffic  
6 routes. As we've heard about from Kate, with regards to the  
7 CTA, I think that a lot of people when they think of the  
8 economic hurdles of electric vehicles, they think of the cost  
9 of the vehicles itself; but the infrastructure, as we know, is  
10 often actually even more expensive, particularly for these  
11 fleets.

12                   And in closer to home and in Minnesota Excel  
13 energy is investing in public fleet charging as well as working  
14 on a subscription and EV pilot rate that would allow customers  
15 to charge their electric vehicles off-peak for a flat monthly  
16 price. And of course there's a lot of other examples. We can  
17 talk about and that Illinois should consider here, but I will  
18 continue to emphasize that while each of these might be one  
19 piece of the puzzle, a piecemeal approach to clean energy  
20 adoption is not going to be sufficient.

21                   It's maximized the environmental and economic  
22 benefits of clean energy for all communities a holistic

1 approach is essential. Regulators, legislatures, utilities,  
2 and stakeholders will all have a role to play in this, and  
3 supporting that as we take steps that are particular realm can  
4 and that we're mindful of how that integrates with a larger  
5 clean energy transformation.

6 Energy efficiency, renewables energy storage,  
7 electrification, grid planning, and process transparency are  
8 all intrinsically linked and are all going to be important here  
9 in order to maximize benefits of clean energy for Illinois.

10 And for the reasons I discussed earlier EDF is  
11 particularly focused on fleet electrification because of all  
12 personal vehicle electrification is certainly going to be  
13 important transitioning fleet vehicle off of diesel burning gas  
14 reaches every citizen and, most quickly, we think addresses  
15 green house gas emissions increases overall air quality.

16 I will do just a couple of quick minutes  
17 because I know I'm running short on time. On the Clean Energy  
18 Jobs Act, which is a tremendous opportunity for Illinois that  
19 is being considered by the Illinois legislature. It does take  
20 the comprehensive strategic approach we need here in Illinois  
21 to improve the environment and the economy in the state. It's  
22 supported by the broad coalition of the Illinois environmental

1 consumer, environmental justice, community and faith-based  
2 organizations, including EDF.

3           Among the three programs that are a part of  
4 the Clean Energy Jobs Act, or CEJA; our electric vehicle access  
5 for all programs; availability of utilitywide the time of use  
6 rates; and incentives for fleet charging coupled with optimized  
7 charging and things that ensure that electrification is  
8 actually beneficial to the grid.

9           Legislation also requires comprehensive  
10 transparent planning and consideration of clean energy  
11 investments. And steeply increases the amount of clean energy  
12 that would be on the grid that these vehicles can be drawing  
13 from. Among the core tenets of CEJA is the related concept of  
14 beneficial electrification and the economic justice because  
15 transportation electrification along with the clean energy  
16 movement is an equity issue.

17           And ensuring affordable transition with  
18 opportunities for every community is absolutely essential.  
19 We're going to hear shortly about workforce development  
20 opportunities within the clean energy space and transportation  
21 electrification as well.

22           So I'll conclude. Again, I want to, again,

1 express my appreciation of the ability to be here today, and I  
2 look forward to hearing from my fellow panelists and taking any  
3 questions.

4 MR. TIM DREA: Good afternoon. My name is not Christie.  
5 My name is Tim Drea.

6 (Laughter.)

7 MR. TIM DREA: I have the privilege of being the  
8 president of the Illinois AFL-CIO, and we represent 900,000  
9 members throughout the state in a variety of occupations. And  
10 because of that, I'm certainly not an expert as what the  
11 panelists are, but I appreciate the opportunity to talk today.

12 Alex, you built the Chevy Bolt. And, Kate, we  
13 build buses and had the opportunity to drive those buses here  
14 in Chicago. So this is a very, very important issue for labor  
15 in Illinois. Just doing some cursory research we found that  
16 there were about 250,000 auto-related jobs in Illinois. That's  
17 manufacturing, repairing, selling, renting everything to do  
18 with automobiles; so it's a very, very big impact on wages, \$16  
19 billion dollars in wages. And a lot of communities, especially  
20 downstate, the selling of cars and vehicles is the largest  
21 sales tax base in these communities and they'd be lost without  
22 that sales tax. So it's very, very important to us.

1                   Henry Ford, legend has it that he said he  
2 wanted to pay his workers \$5 a day in order for them to buy his  
3 car. And that's kind of a half truth; but he really -- his big  
4 problem was the turnover. I think one year I saw a number that  
5 he had to hire 52,000 workers to fill 14,000 spots because the  
6 turnover was so great it was costing them too much money to  
7 keep re-training workers. So it makes sense that, as we evolve  
8 into a new era of automobile manufacturing and the EVs, that we  
9 make sure that workers are covered.

10                   According to the UAW, United Auto Workers,  
11 Ford is told the investors that labor hours be cut by as much  
12 as 30 percent in the manufacture of electronic vehicles.  
13 Now, governmental policy to promote commercial use of  
14 electronic- -- electric technology manufacturing vehicles need  
15 to orient their strategies towards high road employers,  
16 employers such as GM and others that pay a good living wage --  
17 middle class wages.

18                   Illinois CIO supports -- the government  
19 invested into technology and manufacturing of these vehicles;  
20 but the jobs produced need to be paid similar to the jobs that  
21 are lost as we might bring it away from current gasoline  
22 models. Specifically, government funding or any assistance to

1 employers need to make sure we re-invest in the workforce and  
2 the jobs pay good middle class wages, provide adequate health  
3 care for workers, and retirement security.

4           And I personally have been a victim -- I  
5 shouldn't say, "victim", but I've felt the -- as a coal miner  
6 in Central Illinois; and because of governmental policy and the  
7 Clean Air Act in 1990 I was put out of work, but there was  
8 retraining funds made available for me and my co-workers to be  
9 retrained. Many people went into different healthcare -- an  
10 industry such as healthcare, carpentry, construction, HVAC, and  
11 things like that. And it was -- I think I was the only one  
12 that went into this business, but anyway.

13           But we need to make sure that there's  
14 retraining dollars available. And so if Illinois -- I say this  
15 because Illinois invest in emerging technology, it must also  
16 address the issue of displaced workers who were put out of work  
17 due to this governmental action and not solely leave it to the  
18 work marketplace because then workers just lose out.

19           Illinois is willing and ready to embrace new  
20 and clean EV technology to leave our kids a better world is  
21 what you said Katie with the air pollution and stuff; but we  
22 also need to make sure that we invest in the Illinois workforce

1 to ensure that these jobs, current jobs, are protected or at  
2 least allowed to be retrained and keep these middle class jobs.  
3 Mike is going to go into more detail about what that would  
4 entail, so thank you very much.

5 MR. MIKE RAIKES: Well, thank you Commissioner for the  
6 invitation so speak about the impact jobs as a result of  
7 electrical vehicles. I may not be the best speaker today;  
8 however, I am the last, so I have that going for me.

9 (Laughter.)

10 MR. MIKE RAIKES: With the growth of the electrification  
11 of vehicles on the workforce, organized laborers in  
12 anticipating the growth of construction jobs and looks forward  
13 to being a partner in the solution by providing a skilled  
14 workforce. There's no light that the assembly line will change  
15 and more and more electrical workers will be needed to update  
16 new auto plants order bring new life to existing auto plants.

17 Right now in Central Illinois we are seeing a  
18 lot of optimism and energy in what Rivian is doing. We're  
19 excited about the construction jobs that have already started  
20 and anticipate needing a much larger construction workforce in  
21 the near future to meet their needs and bring new life to the  
22 plant. The transition to the electric vehicles will require a

1 lot of investment and retooling in the existing auto plants  
2 that we do have now. The configuration of assembly lines will  
3 change, which also requires a sizable construction crews to  
4 perform those tasks.

5 Battery storage rooms will be needed, which  
6 requires updating and upgrading the electrical services that  
7 provide power for the manufacturing and storage of the  
8 batteries. These all lead to new jobs for a skilled laborer.  
9 Charging stations will be needed so consumers have the  
10 confidence that investing in an electric vehicle will meet  
11 their needs and they will be able to get from Point A to Point  
12 B.

13 Illinois should become a leader and provide  
14 infrastructure so that consumers have the confidence to  
15 purchase these vehicles and auto manufacturers have the  
16 confidence that they can make a return on their investment.  
17 When electric vehicles started to come on the scene a few years  
18 back, there were some municipalities that welcome the change  
19 and have the foresight to provide more investment than others.  
20 I believe this is probably a bigger reason why Rivian chose  
21 Normal, Illinois. Normal currently has over 50 charging  
22 stations in town, so a relatively small area. Normal's dubbed

1 the EV town.

2                   The charging stations have been built with  
3 qualified electricians who have gone through a 5-year  
4 Department of Labor-approved electrical apprenticeship program.  
5 The key for these charging stations to be built efficiently and  
6 correctly is because the electricians performing the work have  
7 the knowledge, the skills, and the ability to complete the  
8 task. Our Commissioners are self-funded; meaning, for every  
9 hour an electrician works the employer and the workers put in a  
10 amount of money for education and training.

11                   For my local in Bloomington every hour that is  
12 worked the worker agrees to take 50 cents out of their check  
13 and the contractor puts 50 cents. So you have a dollar an hour  
14 that goes back into the training fund to meet the needs of the  
15 customers.

16                   Using qualified electricians to make the most  
17 sense and to who should be building the charging stations. We  
18 have a training model that works. We have apprenticeships  
19 throughout the state and country that use the same model. The  
20 classrooms are built. The classrooms are equipped with  
21 computers, and we have shop areas to actually do the hands-on  
22 work. We're able to properly size the gear, the conduits, the

1 wire, and install the chargers efficiently and safely.

2           As I mentioned earlier in Central, Illinois  
3 we're seeing the positive effects of electric vehicles. Good  
4 things are happening. Construction workers who have been  
5 working in other states due to a lack of construction jobs are  
6 able to come back home and find a job. We're getting calls  
7 from electricians from around the state but around the country  
8 as well wanting to know when these -- when the big  
9 infrastructure jobs are going to happen out at the plant.

10           This is an opportunity for Illinois to retain  
11 workers and recruit skilled workers from other states. Jobs  
12 that are attached with good paying benefits are what attract  
13 workers. The biggest challenge we see is communication or lack  
14 thereof from business. We can respect that there's a lot of  
15 technology that is priority in nature; however, we need to know  
16 a time line and an estimate amount of workers needed so that we  
17 can meet the needs of the customers.

18           Providing skilled labor is in our wheel house,  
19 and with little information we can help solve the problem of  
20 training the workforce. That's it. Thank you.

21           COMMISSION MODERATOR: Thank you. Thanks to our  
22 panelists.

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(Applause.)

COMMISSION MODERATOR: We do have some time for questions, so does anybody have questions?

MR. PAT GIORDANO: Hi. I'm Pat Giordano, Giordano & Associates Energy Law Firm. There's been really great presentations by everyone today. And I'd like to ask the question of Dr. Kocs. You threw a lot of numbers at us, which I love. I haven't had a chance to read them yet; but I was wondering about the number about the 3 percent to 10 percent increase in load.

Because from a gut perspective -- from an electric vehicle adoption by 2050 -- from a gut perspective I would have thought that it would be higher than that, if we're getting into, like 75 percent of vehicle miles being driven by electric vehicles. So I was just wondering about that. We're a big supporting of electric-fueled vehicles, but we want to make sure that there's sufficient load to meet the demand.

DR. ELIZABETH KOCS: Thank you for your question. Yes. The total electricity use in Illinois alone by 2050, so it's a reference number. So many of my other numbers I showed in my slides were typically moderate to high numbers, this is more of a reference number. So it's at the lower end.

1 MR. PAT GIORDANO: Thank you.

2 COMMISSION MODERATOR: Just as a reminder, we will post  
3 all of the presentations on our web site, so just go to ICC.  
4 It should be fairly easy to find.

5 Any other questions? Do the Commissioners  
6 have any questions?

7 MR. GREG BORALS (PHONETIC): Greg Borals from Exelon.  
8 There's been a lot of talk about battery costs and battery pack  
9 costs. I don't know if there's any comments around use of  
10 second-life applications and use of a battery post vehicle.

11 DR. ELIZABETH KOCS: I guess I'll start. So, yes, Greg,  
12 I work with George Crabtree, who's also a director of energy  
13 support national lab. He's also UIC energy initiative. And I  
14 think we have Ann Shleiker (phonetic), who is here, and Art as  
15 well.

16 So, yes, the battery themselves, they  
17 certainly -- there opportunities for second use. One thing  
18 that I did want to mention -- and this is a different type of  
19 market, not for the utilities. But right now is the right time  
20 for actually used cars. I think somebody brought it up  
21 earlier, but used cars -- used EV cars isn't the way to get  
22 into the disadvantage communities.

1                   Now, look at the EV itself, and its battery,  
2   it's not longer viable for the transportation. Argile  
3   (phonetic) is also looking at recycling. We need to know that  
4   it's necessary for our energy independence as well. So those  
5   are the -- they're all fairly new pieces. Utilities have been  
6   using them. There is some uses in Europe and also for second  
7   use battery storage based on current and storage technologies.

8           COMMISSION MODERATOR: I just want to thank are  
9   panelists. Thank you Elizabeth, Christie, Tim, and Mike. I  
10   will turn it over to Chair Zalewski, and then we'll be done.

11           COMMISSIONER BOCANEGRA: I'll go ahead and do some  
12   closing remarks really quickly. Again, thank you Chair  
13   Zalewski. Thank you to all of the Commissioners. All of the  
14   advisors, all of the ICC Staff for all of your support. I  
15   especially want to thank all of our audience members. I know  
16   that there are folks here that flew in for this section, so we  
17   are really proud. We hope that we have shared with you guys  
18   some insight as to what's happening across the national  
19   landscape.

20                   I do want to take the time to do a couple of  
21   reminders. First, I'm not sure if you got the e-mail, but AE  
22   if you want to wave your hand. Advanced Energy Group sent out

1 an e-mail. There's going to be an informal non-sponsored  
2 networking session if you guys want to continue the discussion  
3 at a Randolph Taverns just down the street. So if you guys  
4 want to continue to have that discussion, I encourage you guys  
5 to attend.

6 As a final reminder our Office of Retail  
7 Market Development is also hosting its policy session on  
8 January 22nd, at 1:00 p.m. We're going to have panelists from  
9 the retail supplier community as well as consumer advocates.  
10 There will be presentations on consumer education, marketing  
11 practices, and lessons learned during the implementation of the  
12 Part 412 rules.

13 And, lastly, Speakers, if you guys can just  
14 hang back for some photos, that would be great.

15 Chair?

16 CHAIRMAN ZALEWSKI: I just wanted to echo that everyone  
17 did a great job. I'm very appreciative of the panelist. I  
18 learned a lot. I hope everyone enjoyed the presentations as  
19 much as I do. And thank you to Commission Bocanegra. I agree  
20 with Mitch. You had every intention to stay up on time, which  
21 is very difficult to do. And with that the meet is adjourned.  
22 Thank you.

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(Applause.)  
(Whereupon, the above entitled matter  
was adjourned.)