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Technical Conference

Formal Case No. 1050

In the Matter of the Investigation of the
Implementation of Interconnection Standards in the
District of Columbia

Formal Case No. RM40-2022-01

In the Matter of 15 DCMR Chapter 40-District of
Columbia Small Generator Interconnection Rules

Formal Case No. ET2023-02

In the Matter of the Petition of the Potomac Electric
Power Company to Approve a Tariff Change for 20 kW and
Below Residential Solar NEM Interconnections

Moderated by Dillip Kommineni

Tuesday, June 3, 2025

10:00 a.m.

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Public Service Commission of the District of Columbia
1325 G Street Northwest, Suite 800
Washington, D.C. 20005

Reported by: Austin K. White

JOB NO: 7395704

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A P P E A R A N C E S

List of Attendees:

Albert LaFrance, Representative Solar Solution

Hunter Davis, Attorney/Advisor PSC

Nicole Rentz, Commission Member, New Columbia Solar

Knia Tanner, Remote, OPC

Taylor Beckham, Assistant General Counsel, Pepco

Kevin Mara, Consultant, Office of the People's Counsel

Dillip Kommineni, Chief Commission Member

John Budd, Capacity Planning, DER Engineering Group

Lonko Tuma, Senior Engineer, DER Engineering Group

Thomas Bartholomew, Department of Energy & Environment

Brian Lydic, Interstate Renewable Energy Council

Laura Ward, Innovator Fellow Department of Energy &

Environment

Kunle Adeyemo, Assistant Attorney General, Pepco

Kirabo Nsereko, Engineer Pepco, DC Capacity Planning

1 P R O C E E D I N G S

2 MR. KOMMINENI: Dillip Kommineni
3 covering for Brian who is on vacation today. Thank
4 you all for joining the June FC 1050 Technical
5 Conference.

6 Before we start, just a quick couple of
7 housekeeping. If you have any questions, please raise
8 your hand online as well as here. And please state
9 your name.

10 We do have -- our stenographer here
11 will be doing the transcripts. And I believe OPC will
12 be taking notes for today's conference. And for the
13 next one, looks like DOE would be taking the notes.

14 We'll do a quick intro for the folks in
15 the room. Then we can jump into the agenda.

16 Like I said, I'm Dillip Kommineni,
17 Chief of Climate Action PSC.

18 MR. DAVIS: I'm Hunter Davis, Attorney
19 Advisor with the PSC.

20 MR. ADEYEMO: Kunle Adeyemo, Assistant
21 Attorney General with Pepco.

22 MS. BECKHAM: Good morning. Taylor

1 Beckham, Assistant General Counsel for Pepco.

2 MR. NSEREKO: Morning everyone. My
3 name is Kirabo Nsereko. I'm an engineer with Pepco in
4 the D.C. Capacity Planning Department.

5 MS. RENTZ: Nicole Rentz. I'm here
6 with CHESA, the Chesapeake Solar and Storage
7 Association.

8 MR. KOMMINENI: Thank you. Let's get
9 started here. This month we will be focusing on the
10 power flow analysis, and we have three presenters
11 today. We have Pepco, OPC, and IREC. CHESA isn't
12 presenting today. So we just have three presenters.
13 And we would start with Pepco with their presentation.

14 Okay. Do you want me to bring up the
15 presentation or --

16 UNIDENTIFIED SPEAKER: If you can --

17 MR. KOMMINENI: Yeah.

18 UNIDENTIFIED SPEAKER: -- state your
19 name before you --

20 MR. BUDD: Hey, good morning everyone.
21 My name is John Budd. I'll be kicking us off for the
22 Pepco power flow analysis presentation. If -- I don't

1 know who's driving, but I'll just say when to go to
2 the next slide. I'd appreciate that.

3 MR. KOMMINENI: Yeah. John --

4 MR. BUDD: This presentation --

5 MR. KOMMINENI: This is Dillip here.

6 MR. BUDD: Yes.

7 MR. KOMMINENI: Go ahead. Can you
8 spell your last name and the first name, too?

9 MR. BUDD: Oh, yeah.

10 MR. KOMMINENI: Thank you.

11 MR. BUDD: Sorry. Yes. So John Budd,
12 J-O-H-N B-U-D-D.

13 MR. KOMMINENI: Thank you.

14 MR. BUDD: Is it all right if we get
15 started?

16 MR. KOMMINENI: Yes. Sounds good.
17 Thank you.

18 MR. BUDD: Okay. Good morning,
19 everyone. My name is John Budd. I work in Capacity
20 Planning in DER Engineering. I'll be kicking this off
21 for the power flow analysis for power for -- in Pepco,
22 Washington, D.C., and then we'll have a few of my

1 colleagues talk about some of the power flow process
2 and when the studies are actually run.

3 Next slide.

4 So to start off, to introduce the
5 topic, just generally what power flow is and how it's
6 related to the regs and the small generator rules. So
7 if you read through them at a high level, it's not
8 exact language, but effectively what they say is that
9 for level 1 and level 2, there's a line in there that
10 sort of says, "In lieu some of the screens, a power
11 flow analysis may be used to identify what some of the
12 different violations are that we see when
13 interconnecting DERs."

14 And then finally there is a technical
15 explanation that is provided to the customer developer
16 upon completion of that power flow analysis.

17 Next slide.

18 What is power flow? So there's a lot
19 of non-technical folks on the call. I -- I
20 understand. So on the right-hand side you see the
21 transmission tower. It's basically just wires that
22 are strung between two points over a wide geographic

1 area. And that's done at the distribution or the
2 neighborhood level as well. And you'll see the
3 smaller poles.

4 Power flow is effectively how do we, as
5 engineers, understand how the electrical power is
6 flowing along those wires on paper or in today's world
7 on a computer, right. And so it just uses physical
8 laws, and it tries to identify how the electricity is
9 flowing along those wires. And it uses math. There
10 are mathematical techniques that are pretty standard
11 to the industry that different power flow softwares
12 use, or if we do it by hand.

13 And in addition to calculating those
14 electric power flows, it also calculates things like
15 the voltage at a given location in your electric
16 network.

17 Next slide.

18 So for Pepco power flow, to give you an
19 idea of what the landscape looks like, we separate
20 power flow roughly into two types: secondary only and
21 then primary and secondary.

22 And in general, for secondary only

1 power flow, that's where we're looking at DER sizes
2 less than 50 kW. Anything above 50 kW or equal to
3 50 kW, we start doing both primary or considering both
4 primary and secondary.

5 And then within those different two
6 subcategories where it's below 50 and above 50, it
7 sort of gets broken down even further, and we can
8 start looking at the different levels of applications
9 and -- and where they -- they may or may not fall
10 into.

11 So once we get below that, we sort of
12 split it into radial secondary network, secondary on
13 the left, and then on the right you're also going to
14 have radial and networked as well. And that should
15 say "primary." It's a typo, but we can fix that up.

16 So this is sort of the different types
17 of power flows at a very high level. You can think of
18 the -- the scope of where power flow is being run
19 at -- at Pepco for the different types of systems.

20 Next slide.

21 So power flow can be broken down into
22 three main processes or three main steps shown below

1 by that flow chart. So the first part is the actual
2 electric data models. These are the -- the
3 mathematical representations of the electric system.

4 And they are the most critical part
5 because if those models are not accurate, the old
6 saying is you put garbage in, you're going to get
7 garbage results out. So those models are are key.
8 They sort of drive everything.

9 The next step is the actual power flow
10 engine. And in -- in all cases today that engine is
11 really just software, and it's implementing a
12 mathematical technique or equation. And there's
13 different techniques that can be used that are pretty
14 standard to the industry.

15 And then finally after that engine
16 calculates the results, they are distributed to
17 reports that can be reviewed by engineers where they
18 can determine what types of upgrades are needed based
19 on the violations that are being observed by that
20 power flow. And like I said, accuracy is key.

21 Next slide.

22 Currently the software vendor is EDD at

1 Pepco. This is sort of implementing that process
2 flow, the electric model, the power flow engine, and
3 ultimately the reports as well. And the name of the
4 software is Distribution Engineering Workshop, DEW.

5 At Pepco we are constantly exploring
6 new ways and trying to upgrade our systems as needed.
7 But this is currently the software solution we have.

8 Next slide.

9 So that was sort of the introduction to
10 power flow. I'm going to talk about now -- we sort of
11 touched on this last week when we talked about limit
12 violations. The power flow study itself gives you the
13 results which then are sort of compared against
14 different limit violations.

15 And I'm going to talk about the most
16 common ones which are published in our TIR. That's
17 sort of what we're deriving this from. And I'll also
18 try and relate them to some of our restriction maps,
19 feeder maps to try and illustrate how some of these
20 limits are displayed publicly.

21 Next slide.

22 So at a high level, the technical

1 interconnection requirements for DERs at Pepco,
2 it's -- it's sort of the document we have that says
3 what we need to do to integrate DERs into the Pepco
4 distribution grid. It's created in conjunction with a
5 lab EPRI.

6 It's structured around 1547, 2018 and
7 other standards where applicable. And the goal of
8 that TIR is to maintain a safe and reliable grid while
9 accommodating the most amount of DER capacity as
10 efficiently and economical as possible.

11 So at the bottom here we have a little
12 process flow chart that tries to relate what does TIR
13 have to do with power flow. So if we talk about the
14 TIR document on the left, what's found in that?

15 There is system limits, design
16 requirements, operating requirements, equipment
17 requirements are some of the main things. The system
18 limits are what we're most focused on here. And we
19 talk about the technical review that Pepco does as
20 part of the interconnection process in the middle
21 there.

22 Within that technical review, the power

1 flow is performed, and those power flow limits are
2 derived from some of those system TIR limits.

3 So that's how the -- the TIR sort of
4 relates to the actual power flow analysis, which is
5 conducted as part of the technical review.

6 And ultimately the goal of all of this
7 after the technical review is to prevent that
8 unreliable, unsafe, in-grid operation, prevent all
9 these issues that can be caused by the DER and try and
10 correct them to enable that DER to get online prior to
11 operation of that DER on our system.

12 Next slide.

13 This document is shown on our website.
14 If you wanted to see what some of these system
15 requirements are or design requirements, we've put
16 together quick references guides that sort of show all
17 of this information from our TIR. And I have the
18 links posted in this website if anyone is interested
19 on our public website.

20 Next slide, please.

21 So we'll go through some of the most
22 common limits that we talked about that can be found.

1 So the first one that's probably the most prevalent to
2 DERs are the voltage limits. So the ANSI standard
3 will be cited in our TIR. And it's talked about,
4 ANSI C84.1.

5 So in general, when we're looking at
6 voltage, if we put it on a percent or per unit basis,
7 regardless of whatever the nominal voltage is, we want
8 to keep the voltage below 105 percent or 105 per unit.
9 And we want to keep it above 95 per unit.

10 And in general, it's typically
11 overvoltage is going to be the problem that DERs
12 cause, but there are some rare cases where DERs can
13 cause undervoltage as well. And this is -- and if we
14 identify preexisting limit violations on the primary
15 part of this feeder, these feeders will be restricted
16 type B. And that restriction can be identified on our
17 website, which is shown at the below PHI restrictions
18 link.

19 Next slide, please.

20 The next limit that's common -- not --
21 actually, this is not that common, but it is something
22 that's relevant from a voltage standpoint is TIR -- is

1 in our TIR, our voltage fluctuations and flicker
2 limits. So we have some relevant standards here cited
3 from 1547 which talk about RVC voltage or limits on
4 DER caused voltage fluctuations.

5 In general, we sort of limit our
6 flicker to 0.35, which isn't directly power flow, but
7 some of the data needed to calculate and compare that
8 flicker evaluation comes from power flow, which is why
9 it's mentioned.

10 And then also we calculate the voltage
11 at all the different equipments that may regulate our
12 voltage. So regulators, for example, will look at the
13 voltage at each regulator and see if that DER is
14 causing that regulator's bandwidth to be exceeded.
15 That can be done at capacitors as well depending on
16 the type of control used.

17 And then finally, feeders that end up
18 exceeding this violation preexisting, right, in the
19 base case, as we talked about last time a few meetings
20 ago. These feeders can be identified on our website
21 at the primary level only for type B and type E. And
22 the link to those restrictions are below as well.

1 Next slide, please.

2 The next limit that's most common when
3 looking at DERs interconnecting to our system that
4 power flow is sort of calculating for are the
5 equipment thermal and loading limits. So this is
6 pretty much from our TIR.

7 Basically, there's different types of
8 equipment on the Pepco distribution system. There are
9 underground cables, distribution service transformers.
10 There are fuses, reclosers, breakers, switches, a lot
11 of different types of equipment that I can't name
12 every -- all of them.

13 But effectively the power flow analysis
14 that we perform will identify where we exceed the
15 manufacturer rating limits of these different types of
16 equipments.

17 In Pepco there is an exception, and
18 this is called out in our TIR for the substation
19 transformer. There are N minus one and N minus zero
20 conditions that cause us to look at reverse flow for
21 40 percent of the aggregate substation rating to
22 prevent transformer derating under those different

1 types of conditions.

2 And where we have preexisting limit
3 violations for this type of loading limit at the
4 feeder and substation level only, you're going to see
5 these feeders restricted to type D and type G. And
6 those restrictions are shown on our website.

7 Next slide, please.

8 I believe this is the final common one
9 that we have. And this is one where it's sort of --
10 it's highly different, depends on the type of
11 equipment where you're seeing reverse power flow.

12 Reverse power flow is not necessarily a
13 bad thing. There are -- there, you know, there are
14 ways to accommodate it, but depending on the type of
15 equipment that you're sending the reverse power flow
16 through, you may need to take some kind of action.

17 So that may require upgrading the grid.
18 It may require changing a setting to a type of
19 equipment. It may require both. There are different
20 ways to address it; right?

21 And so when we talk about reverse power
22 flow, we have what we call safety buffers within our

1 TIR requirements. These safety buffers basically
2 prevent us from getting to the absolute point of where
3 we hit reverse power flow. They're designed to give
4 us a little bit of margin.

5 So for example, if, you know, reverse
6 power flow you would think would happen just when the
7 power goes from zero kilowatts to negative. We have a
8 little bit of buffer there. And that's to account for
9 things like model inaccuracy, intolerance, seasonal
10 changes of load. So we're not going right over the
11 threshold immediately upon some minute change to the
12 system.

13 What are the different types of
14 equipment that can't -- that may not be able to handle
15 reverse power flow? So voltage regulators are
16 probably the most common ones. They require upgrades
17 to the regulator itself in some cases, control and
18 telemetry, to prevent mis-operation and high voltage.

19 So we've -- we've actually had cases in
20 the field where we have reverse power flow to
21 regulator that was not set properly, and we -- we had
22 to disconnect the DER because it was causing high

1 voltage.

2 So these -- these -- when we see these
3 cases in different parts of our territories, we have
4 to fix them.

5 Circuit terminals may need to be
6 upgraded. It's -- it's rare, but in some cases the
7 feeder relays may be sensitive to directional
8 settings, and that's evaluated on a case-by-case
9 basis. But this is much rarer, and it's not as
10 common.

11 Network protectors are very common in
12 D.C. It's probably -- actually that's probably the
13 most common if you leave out the radial networks.
14 Network protectors can handle no reverse power flow.
15 So they are very sensitive. And where we have network
16 protectors, we do need to evaluate if there is reverse
17 flow going through them and mitigate as needed.

18 Capacitors may require adjustments
19 through the reverse power flow. It's less common in
20 Pepco because there is a centralized brain that
21 controls them. But I -- I simply mention it. If
22 there are Volt/VAR controls, this can cause issues as

1 well.

2 And then the substation transformer is
3 probably the most critical piece because if you
4 reverse power flow through the substation
5 transformer -- we talked about this a few meetings
6 ago -- it can outage the entire substation, which
7 could be thousands and thousands of customers.

8 Where we have preexisting limit
9 violations of this type at the substation, we will
10 restrict these feeders to type A, and you can see that
11 on our website.

12 And where we have reverse flow on
13 network feeders, that's primarily the network
14 protector issue. Those feeders should be restricted
15 to type N. And those will be shown on our website at
16 the below links. These are preexisting violations.
17 They do not account for in-review DER that are -- that
18 currently have not committed to interconnecting.

19 Next slide.

20 All right. And now I will hand it off
21 to Lonko and Kirabo. They will be talking about the
22 actual -- a little bit more into the nuts and bolts

1 about how the power flow processes run.

2 And Lonko, you can -- you can start it
3 off. Just, I guess, remember to spell your name for
4 the stenographer. Thank you.

5 MR. TUMA: Thanks, John.

6 Good morning. My name is Lonko Tuma.
7 First name L-O-N-K-O. Last name T-U-M-A. I am a
8 senior engineer at the DER Engineering Group. I will
9 be going over the power flow process for below 50 kW
10 on a radial feeder.

11 Next slide, please.

12 So this page is about the power flow
13 for, like I said, for the below 50 kW on a radial
14 feeder. I'll just go through this point by point.

15 So our powerful process starts with
16 initially getting the application and technical review
17 in CTG. And from there we move -- move forward with
18 pulling the address in our GIS system and getting the
19 service transformer.

20 Using that, we can isolate the circuit
21 where the application is, and we can also pull into
22 some of our existing database on existing DER on that

1 circuit.

2 Next we would input that transformer in
3 our DEW model. I believe John went over that. And --
4 and we'll pull up the -- the model in DEW. And we
5 will verify that model with what we have in GIS and
6 any other information that we may have, specifically
7 with the existing generation on that circuit.

8 Next we would run what we call a before
9 case study. This is just a power flow -- an initial
10 power flow without the -- the current application that
11 we are analyzing.

12 If that fails, that means we have an
13 existing problem on -- on that circuit and we would
14 run studies to mitigate that. And from that we can
15 create a job to -- to address those before the
16 customer can interconnect.

17 Now if that passes then we would move
18 over to the second power flow, which is what we call
19 an after case study. And this includes the current
20 application. And again, if that fails then we run a
21 circuit mitigation to analyze for a downsize option or
22 if the case upgrades.

1 If it passes, it moves -- it moves over
2 to technical review. No upgrades required. If it
3 fails and we do the upgrades, then we have a technical
4 review, complete with upgrades, required.

5 And from this we can come up with a
6 scope of work for the customer and what is necessary
7 to get that circuit back up to normal operating
8 conditions before they can interconnect.

9 Next slide, please.

10 So during our power flow, these are
11 some of the assumptions that we make. So the first
12 one would be for each load on that circuit. We have a
13 minimum daytime load that we apply to each of the
14 residential loads on the circuit. So -- and this
15 comes from a -- an average of a sample of real-time
16 values that we have on our system.

17 And the next assumption we would make
18 is for the existing generation on the feeder on the
19 circuit, we -- we apply the PHI Volt/VAR curve to the
20 power factor setting. And all other inverters we just
21 apply a unity power factor.

22 And again, as I mentioned before, to

1 make sure -- we -- we do verify that the -- the
2 model -- we do verify the model. So sometimes field
3 verification may be necessary to make sure that we
4 have an accurate model before we run our power flows.

5 And the starting voltages for our
6 circuit transformers are based on feeder or the
7 substation voltage.

8 Next slide, please.

9 So this is some of the common
10 mitigation we do when we do have a failure when we'd
11 run the power flow. So in case of, say, transformer
12 overload, we -- we upgrade the transformer to the next
13 standard size transformer. For voltage above the NC
14 limit we upgrade the conductor to -- to the -- to the
15 extent that it eliminates the violation.

16 Same thing for the TIR -- TIR flicker
17 voltage violation, conductor terminal limit violation,
18 and for line regulator reverse flow. I believe John
19 mentioned as well. We could change the settings on
20 the -- on the regulator to cogen mode.

21 Next slide, please.

22 This is for Kirabo.

1 MR. NSEREKO: Hello, everyone. My
2 name's Kirabo Nsereko, as I mentioned earlier. First
3 name is K-I-R-A-B-O. Last name N-S-E-R-E-K-O.

4 So here I'll be talking about power
5 flow for secondary network in a connected PV. So if
6 we -- if we receive an application less than 50 kW,
7 and we determine that the point of connection is -- is
8 on the grid network, then in general there's no power
9 flow required.

10 If the aggregate PV generation on that
11 network is less than 5 percent of the network peak
12 load and basically this is done to expedite the review
13 process.

14 Next slide. Next slide, please.

15 All right. So here I'll be talking
16 about power flow process for applications 50 kW and
17 above.

18 Next slide, please.

19 All right. So first of all, I'll be
20 talking about power flow for radially interconnected
21 feeders. So the software model we use in this case is
22 DEW. And so some of the pre-checks that we do before

1 performing the power flow analysis would be to verify
2 the PV system size and location on the feeder.

3 And then in DEW we would confirm that
4 the feeder model corresponds to that which is in GIS.

5 And then for power flow simulation
6 inputs, some of the inputs are existing and
7 prospective solar systems on the feeder. And the 8760
8 hourly customer loads on that feeder, and also the
9 estimated hourly solar generation for the solar
10 applications on that feeder, both existing and
11 prospective.

12 And then for the power flow setup, we
13 would identify solar systems within 2,000 feet of the
14 system in review. And then we would verify critical
15 days and times on which to perform the power flow.
16 And these critical dates are based on the PV output
17 and the daytime load.

18 And then we would select a scenario
19 simulating PV generation swings from 100 to
20 20 percent.

21 Next slide, please.

22 All right. So after we obtain the

1 inputs and set up the simulation, we would run the
2 power flow. We -- we run both a before case and a
3 after case. The before case does not include the PV
4 system that we'll be reviewing. And then we would run
5 a after case that includes that PV system that we're
6 reviewing.

7 And for the after case, if there's no
8 power flow violations then, you know, we would say the
9 power flow passes and we're good to go. But if there
10 are violations then those violations need to be
11 addressed.

12 And some of those violations are
13 voltage -- overvoltages, flicker, and reverse power
14 flows. And reverse power flow would be through the
15 voltage regulators.

16 And some of the steps we use to
17 mitigate these violations are, for example -- for
18 example for overvoltage and voltage flicker, we may
19 require a PV system size downgrade, or we could change
20 the inverter settings to a leading power factor or
21 absorbing VARs. And the power factor would be between
22 1 and 0.9.

1 And then for reverse power flow
2 violation through a voltage regulator, we would
3 upgrade the voltage regulator controller and that'd be
4 at no -- no cost to the customer.

5 Next slide, please.

6 All right. So here I'll be talking
7 about power flow for secondary network interconnected
8 PV. The software that we use is EasyPower.

9 And one of the main differences when
10 performing the power flow for network as compared to a
11 radially interconnected system are that the networks,
12 the PV system output, has to be limited to avoid
13 reverse power flow through our network transformers
14 because this reverse power flow could cause the
15 network protectors to trip, thus potentially
16 disconnecting customers from the network.

17 And so for our networks we -- we
18 basically have two types of networks. We have a grid
19 where the customer is connected to a mesh network of
20 transformers. And in this -- this way there's more
21 than one path for power to flow to the customer.

22 And the second type of network we have

1 is a spot network, and this is where the customer is
2 applied from two or more dedicated transformers.

3 Next slide, please.

4 All right. So here I'll be going a
5 little bit more into depth on how we perform the power
6 flow for the secondary networks. So for a
7 grid-connected customer power flow is required to
8 determine the maximum export limit at that location.
9 And that's basically so that there's no reverse power
10 flow through the network protectors.

11 And the maximum power export or MEL, or
12 maximum export limit, is determined under the
13 network's minimum daytime loading conditions. And
14 it's based on the excess power allowed at the customer
15 location.

16 But in certain instances, for example
17 when there's, like, a low load at the customer point
18 of interconnection, the grid customer may be required
19 to import power from the grid and maintain a minimum
20 import level.

21 And then moving on to a spot-connected
22 customer. Due to the spot network configuration,

1 there is no power export allowed at any given time.
2 And to prevent the reverse power flow through the
3 network protectors, customers are required to always
4 import power from the grid. And the minimum required
5 import is 20 percent of the minimum daytime load, but
6 no less than 21 kW.

7 Next slide, please.

8 I'll be turning it over to Lonko from
9 here.

10 MR. TUMA: Yeah. So this is how we
11 document the results of our power flow.

12 Next slide.

13 So currently what we submit to the --
14 to the customers after we -- we -- after the
15 conclusion of our power flow is -- is scope of work
16 with the upgrades needed. As you can see on the
17 right-hand side, I highlighted that in yellow.

18 Moving forward what we plan to include
19 in that -- in that estimate letter would be what you
20 see on the left, which is the results from our power
21 flow itself. This highlights the violations that
22 we've identified during each power flow, so that what

1 you see on the left-hand side gives you an example of
2 a sample project.

3 So at the top left-hand corner there
4 that's -- moving forward, that's something we would
5 add to -- to our report for each -- for each project.
6 And on the left-hand side at the bottom, that's also a
7 sample of the capacity planning technical review,
8 which we also plan to add to -- to the report. And
9 that gives you an analysis of each project and from a
10 capacity point of view.

11 And like I said, this is moving forward
12 so this is currently not -- not on -- not being shown
13 to the customer.

14 Next slide.

15 MS. BECKHAM: That's it. That's it,
16 Lonko. That's the last slide.

17 MR. TUMA: That's it? Okay.

18 Okay. So that's our conclusion. Do
19 you have any questions?

20 MR. KOMMINENI: Thank you for the
21 presentation. This is Dillip from PSE. I have a
22 couple of questions.

1 First question I have is, which stage
2 of this interconnection process is this power flow
3 done? I know there's several stages from
4 pre-application to level 1 screening and level 2
5 screening. So is this done in multiple stages or --
6 or do you guys do it at the front end?

7 MR. TUMA: So this power flow is done
8 during the technical review stage. So -- and we do
9 technical review for level 1 and level 2s. So again,
10 once you've completed the first stage and the
11 completed review by CTG, and the engineering team gets
12 the applications, we place them in technical review
13 and this is part of that process.

14 MR. KOMMINENI: That would be level 1
15 screening within the process?

16 MR. ADEYEMO: Yeah. I was also going
17 to say -- is it slide 15? I think that it might be.
18 I don't know if this helps, Lonko, as you go through
19 that. Sorry, Kunle Adeyemo with Pepco.

20 MR. TUMA: Yeah, thanks Kunle. So
21 yeah, so as -- as it -- on the power flow sheet here,
22 the beginning of the power flow process starts when we

1 receive the application from CTG. So that's after
2 your completeness review. I don't know if -- Dillip,
3 I don't know if that answers your question.

4 MR. KOMMINENI: Yeah. That's good.
5 Thank you. Let me turn it on to other folks on the
6 call. I do see Kevin Mara.

7 MS. TANNER: Good morning, this is Knia
8 Tanner. I'm just -- I'm taking notes and just real
9 quick, if you use an acronym, can you spell out what
10 it means so I can make sure I can capture that? Thank
11 you.

12 MR. KOMMINENI: Thank you. I think I
13 have first Kevin Mara on the call. That's whose hands
14 are raised.

15 MR. MARA: Yeah. Thank you. On slide
16 number 11, if we could go there. You list flicker at
17 0.35. What's the value for that? Are you using
18 IEEE 1789 or -- or 519 or what -- what's the units for
19 that flicker?

20 MR. BUDD: It's dimensionless.

21 MR. MARA: So you're -- you're using
22 the -- the IEEE 1789 on that one.

1 MR. BUDD: It would --

2 MR. MARA: Is that right?

3 MR. BUDD: Good. It -- it would be
4 basically taking the change of voltage ratio times
5 some kind of shape factor. I -- I can't recall the
6 exact calc. I'd have to go back and see what the
7 exact -- but there's like a minute per second or
8 changes per minute to estimate that value. And it's
9 all just an estimate in the end. You're not going to
10 really know what it is until you measure it in the
11 field.

12 MR. MARA: Okay. And so the -- the
13 other value there, the POI less than 3 percent, could
14 you explain that one?

15 MR. BUDD: Yeah, so basically this is
16 relating to the IEEE standard, the one above, 1547.
17 It's around that RVC. Basically, you're looking at a
18 change -- I believe 1547 says something like averaged
19 over 1 second, a 3 percent change.

20 We don't really have a good way to do
21 this with power flow. This is something that I
22 mentioned there 'cause it's just a criteria that's in

1 our RTIR that you're still held to because it's in
2 1547.

3 MR. MARA: Okay.

4 MR. ADEYEMO: Sorry. Can you guys
5 spell out the acronym POI?

6 MS. WARD: Point of interconnection.

7 MR. MARA: Point of interconnection.

8 MR. BUDD: But effectively that change
9 of 3 percent, that percentage is what feeds into the
10 flicker calculation at the POI.

11 MR. MARA: Okay. So basically you're
12 turning the -- the solar or DER off and on and seeing
13 what the -- the change in voltage is?

14 MR. BUDD: Yeah. And Lonko or I think
15 it was -- I forget who described it -- but we sort of
16 outline that in a previous slide. We go from -- I
17 think it's -- was it 20 to a hundred, and we look at
18 only DERs within 2,000 feet.

19 MR. MARA: Right. Yeah, that was
20 mentioned on the larger feeder analysis. And finally,
21 as a -- as a point, I'm pretty sure -- and correct me
22 if I'm wrong -- that within the District there are no

1 line voltage regulators.

2 MR. BUDD: I don't think that's true.
3 And we certainly have LTCs at every single substation.

4 MR. MARA: Oh, agreed.

5 MR. BUDD: So, there is regulation at
6 every substation.

7 MR. MARA: Agreed. Agreed. We have
8 regulation at all the stations, but pretty sure you
9 don't have line regulators, or if you do, there's very
10 few. Okay, thank you. That was all my questions.
11 Appreciate it.

12 MR. KOMMINENI: Thank you, Kevin. Next
13 we have Thomas -- Thomas, if you don't mind, can you
14 spell your name?

15 MR. BARTHOLOMEW: Yeah. My first name
16 Thomas, normal spelling. The last name is
17 Bartholomew, B as in boy, A-R-T-H-O-L-O-M as in Mary,
18 E-W. I'm with the Department of Energy & Environment.

19 I was wondering why you guys use
20 different software packages to do the analysis for a
21 different size system. Can you just explain, like,
22 what the, you know, why you -- why the different

1 software is needed for different -- the different
2 analyses.

3 MS. BECKHAM: Do we have someone from
4 the capacity planning team who wants to respond to
5 that?

6 MR. NSEREKO: Yeah, I couldn't speak to
7 that. So we use DEW for radially interconnected
8 feeders, and we use EasyPower for our networks.
9 Reason being is networks can't really be modeled in
10 DEW. So that's -- that's why we use EasyPower for
11 that. Hope that answers your question.

12 MR. BARTHOLOMEW: So I guess I'm
13 just -- I mean, so EasyPower wouldn't also be --
14 couldn't also use for radial? I mean just it doesn't
15 have that functionality or -- I'm just -- I'm just
16 wondering why two systems? Do they -- do they both
17 only work on the certain type of networks? Is that
18 what you're saying?

19 MR. NSEREKO: Difference -- difference
20 is that EasyPower doesn't have some of the
21 functionalities that DEW has. So with DW -- DEW we
22 could perform a time -- time series power flow,

1 whereas networks, that's a bit -- we -- we're not
2 really able to -- to perform that time series.

3 MR. BARTHOLOMEW: And so why is the
4 time series important?

5 MR. NSEREKO: John Budd, are you able
6 to help me out on this one?

7 MR. BUDD: I -- I don't think it's time
8 series per se. I think you're talking about finding
9 the minimum daytime load. The reason why it's -- it's
10 because the networks are not in DEW. They're in
11 EasyPower. I think that's the short answer.

12 MR. BARTHOLOMEW: Just again, I'm not
13 sure what that means. They're not in -- you mean you
14 just --

15 MR. BUDD: Electric models are not in
16 DEW they're in EasyPower. I think that's the short
17 answer.

18 MR. BARTHOLOMEW: Okay. So the -- the
19 type of design of the network is not, like, preloaded
20 in the software that you're working with. Is that --

21 MR. BUDD: Correct.

22 MR. BARTHOLOMEW: Okay. Okay. All

1 right. Thank you.

2 UNIDENTIFIED SPEAKER: Does that answer
3 your question, Tom?

4 MR. BARTHOLOMEW: Yes. Yep.

5 MR. KOMMINENI: Moving on to the next
6 person, Brian Lydic. Brian, if you can spell your
7 name. Thank you.

8 MR. LYDIC: Yeah. It's Brian,
9 B-R-I-A-N, Lydic, L-Y-D-I-C with Interstate Renewable
10 Energy Council or IREC.

11 A couple quick questions on the reverse
12 power flow limits or buffers that you mentioned. I
13 didn't -- I didn't catch if you had listed them all or
14 all the types of various power flow buffers on that
15 slide. But are those listed in your TIR for -- for
16 all the different potential types of buffers that you
17 might have?

18 MR. BUDD: Yes, yes. They are in our
19 TIR.

20 MR. LYDIC: Okay. Great. And then you
21 mentioned there's -- you utilize an 8760 of customer
22 loads that you input into the power flow. Is that --

1 is that like disaggregated AMI data that you're
2 inputting there, or can you describe that real quick?

3 MR. BUDD: Are you referring to the
4 larger than 50 or the less than 50?

5 MR. LYDIC: That's a good question.
6 This was on the -- this was on the --

7 MR. BUDD: It was larger than 50.

8 MR. LYDIC: -- process flow diagram. I
9 can't remember which one. But is there a difference
10 between the -- the two and -- and how you input the
11 customer data?

12 MR. BUDD: Can you go to the next
13 slide? Oh, keep going. We're at the beginning now.
14 We want to go to Lonko's part. One more.

15 So if you look at his -- the first
16 point for less than 50 it's set to an average of
17 sampled PHI real time load data. Lonko, Is this AMI?

18 MR. TUMA: Yes. Averages --

19 MR. BUDD: Okay. Yes. There would
20 be --

21 MR. TUMA: Okay. That would be the
22 average.

1 MR. BUDD: It is? So that's correct.
2 It's an average for less than 50 and if you go to
3 greater than 50, it's on the next few slides where
4 Kirabo -- keep going. That one. Sorry. Back up.
5 First slide. One more. One more. Okay. This one.
6 Okay.

7 So this uses the exact load, I believe.
8 Yes. Is that -- is that true?

9 MR. TUMA: Yeah. Here the 8760, that's
10 the hourly AMI load.

11 MR. BUDD: Yep.

12 MR. TUMA: Customer load.

13 MR. BUDD: Okay. Yep. And it just
14 pulls the minimum load at that time and pulls it in.
15 That's what I thought. I just wanted to confirm with
16 Kirabo.

17 UNIDENTIFIED SPEAKER: Okay. So
18 that's, yeah. So that's just basically for
19 selecting -- selecting the one hour that you're doing
20 the power flow analysis at is analyzing that 8760;
21 correct?

22 UNIDENTIFIED SPEAKER: Correct.

1 UNIDENTIFIED SPEAKER: Got it. Okay.

2 Thank you.

3 MR. KOMMINENI: If you're all set next,
4 moving on to Laura Ward. Can you spell your name and
5 where you're from? Thank you.

6 MS. WARD: Yeah. Good morning everyone.
7 My name is Laura Ward, W-A-R-D. I am the Energy
8 Innovator Fellow Department of Energy & Environment.
9 Thank you for your presentation.

10 Related to the power flow studies, so
11 while traditional power flow analysis primarily
12 focuses on voltage levels as you explain in every
13 single level of voltage and power flows through
14 transmission lines, incorporating frequency
15 considerations is essential for -- for understanding
16 of system dynamics and stability.

17 My question is related to this. If
18 Pepco is considering frequency violations in their
19 power flow analysis for the future?

20 MR. BUDD: So if we were going to
21 consider frequency, it would have to be a level 4, and
22 I believe there's a provision in there that would

1 allow us to do additional analysis that could evaluate
2 frequency, but I don't think it would be powerful. I
3 think it'd have to be another type of analysis.

4 MR. KOMMINENI: John, can you be a bit
5 louder here? I think -

6 MR. BUDD: Yeah. Sorry. Is that -- is
7 that better?

8 UNIDENTIFIED SPEAKER: Just FYI folks
9 who are joining virtually can hear you just fine,
10 John, but sounds like -- in the room.

11 MR. BUDD: Oh, okay. So to -- to
12 review frequency, I think you're getting at
13 stability -- system stability maybe at, like, the
14 transmission level. That would have to be a level 4
15 review. And there's a provision in level 4 that talks
16 about evaluating stability. So that would have to go
17 to a level 4 review, and it would probably take a
18 little bit more than what we do right now as part of
19 our power flow.

20 MS. WARD: Okay. Thank you.

21 MR. KOMMINENI: All right. If you're
22 all set, then moving on to Albert LaFrance.

1 MR. LAFRANCE: Thank you. My name is
2 Albert LaFrance. That's L-A-F-R-A-N-C-E, first name
3 Albert. I'm with Solar Solution.

4 A question regarding interconnections
5 on secondary networks. I'm wondering if -- if Pepco
6 is investigating any of the potential technologies
7 that would allow some degree of power export through a
8 network protector, you know, limited in -- in -- both
9 in -- in magnitude and duration.

10 I'm looking, you know -- so I know some
11 utilities have looked at desensitizing the network
12 protector and then there are even more sophisticated
13 solutions such as being used by the ENMAX Canadian --
14 excuse me -- Canadian utility that would actually put
15 a restraint on the network protector so that it will
16 not operate unless there's actually a fault detected
17 on the network.

18 And of course, that requires high-speed
19 communications. That's a more advanced technology.
20 But just wondering if -- if Pepco is looking at any of
21 those possibilities.

22 MR. BUDD: I mean I -- I can't speak to

1 those specific ways, but we're always looking to
2 increase the amount of solar on our secondary
3 networks. I don't know -- yeah.

4 MS. BECKHAM: Sorry. John, can you
5 just spell your name and let the court reporter know
6 what you're from?

7 MR. BUDD: Oh, J-O-H-N B-U-D-D.

8 MR. KOMMINENI: Albert, are you all set
9 or do you still have any questions?

10 MR. LAFRANCE: Just -- yeah. If I
11 could just -- actually not really follow up, just
12 somewhat related to that. We don't do a whole lot of
13 network interconnections, but one thing I've noticed
14 that's changed is -- is, you know, in your
15 presentation you mentioned that, you know, the -- the
16 minimum import would be at least 21 kilowatts.

17 And I've noticed that more recently
18 that's being specified on a per phase basis. In other
19 words, the operating requirements, we'll say
20 7 kilowatt minimum on any phase rather than 21. And
21 so that causes, you know, more curtailment and -- and
22 relay trips.

1 And I was just wondering if -- if you
2 could discuss, you know, the reasons for that. I
3 assume it's the way the -- the network protector
4 relays are set up, but you know, it -- it does cause
5 more -- if there's an imbalance, you know, a lot of
6 times we'll see that the total load will be -- will
7 exceed the -- the minimum but one phase will be below
8 the -- the per phase limit. So I was just curious
9 about that.

10 MR. BUDD: We'll have to follow up with
11 our protection teams, but I believe it's because the
12 network protector operates on the worst phase.

13 MR. LAFRANCE: Okay. Yeah, that makes
14 sense, yeah. But are you seeing -- again, I -- I
15 guess a follow-up on that would be on many of the
16 older systems that just worked on the -- that were
17 given operating requirements on an aggregate basis --
18 in other words, say 20 -- it just says "maintain
19 minimum import of 21 kilowatts."

20 Were you seeing mis-operations because
21 of those imbalances, or is that more of like a -- just
22 a -- a proactive change in the requirement?

1 MR. BUDD: Again, I -- I'd have to
2 follow up. I have not seen it personally, but it --
3 it's possible other folks have. So we'll have to
4 follow up.

5 MR. LAFRANCE: Okay. Thank you.
6 That's -- that's all I had. And by the way, I
7 appreciate all of your presentations today. They've
8 been very informative.

9 MR. BUDD: You're welcome.

10 MR. KOMMINENI: Thank you, folks. It's
11 five minutes to eleven. Maybe we can take a quick
12 stretch break and regroup at eleven. And then we will
13 move to the next item, which is the OPC's
14 presentation.

15 Knia, would you be presenting the --
16 your slides or is someone from your team going to be
17 presenting?

18 MR. MARA: This is Kevin Mara. I'll --
19 I'll be presenting --

20 MR. KOMMINENI: Yeah.

21 MR. MARA: -- for OPC.

22 MR. KOMMINENI: Perfect, Kevin. Kevin,

1 would you like to bring up the slides at eleven, or do
2 you want me to bring it up?

3 MR. MARA: I'll go ahead and pull them
4 up now to get ready.

5 MR. KOMMINENI: Perfect. Thank you.
6 We'll regroup at eleven. Thank you.

7 (Off the record.)

8 MR. KOMMINENI: Kevin, do you want to
9 get this going?

10 MR. MARA: Sure. Thank you. Good
11 morning, this is Kevin Mara. Last name is M-A-R-A.
12 I'm a consultant working with the Office of the
13 People's Counsel on this case and -- and other cases.
14 And so I'd like to just kind of review some of OPC's
15 comments regarding the -- the power flow and some of
16 our thoughts regarding power flow for the customers.

17 Okay. So I'm going to talk about some
18 of the screening levels, the starting voltage
19 assumption, and -- and some transparency issues that
20 we see. And that's what I'm set up to talk about
21 today.

22 So in -- in level 1 it allows for

1 screening for those applications less than 20 kW. We
2 heard today from Pepco that sometimes they skip the
3 screening process and jump right into -- to modeling
4 the screening process. And -- and our opinion is
5 there to try to speed up the process even more by not
6 having to do the power flow.

7 And so in a lot of jurisdictions, small
8 kW solar has minimal impact and therefore doesn't
9 require the full-blown power flow analysis. And so
10 one of the screenings that's currently in there is the
11 export shall not exceed 15 percent of the line
12 section, and so in the line section that would be down
13 line of a fuse or some type of overcurrent protective
14 device.

15 The intent is with the 15 percent. If
16 the -- if the DER was greater than the minimum load,
17 it's possible to have an -- an island, an
18 unintentional island. And if the DER is not big
19 enough to support the load, then an island can't be
20 sustained.

21 And so this has been a -- a
22 longstanding screening, which is very conservative to

1 use the -- the 15 percent. We already heard from
2 Pepco that they have the ability to pull out the
3 average -- I mean the hourly demand of customers on a
4 feeder. Presumably, they could do it on a subset of
5 that which would be a group of customers served by a
6 transformer.

7 So it would be possible to get the
8 minimum daytime loads either at the transformer or on
9 the feeder itself. And again, that's really what
10 we're after is to find that -- that minimum daytime
11 load.

12 A 33 percent penetration is a level
13 that's contained in 1547.7. It's a slightly older
14 standard, but it is a screening tool that's used in a
15 lot of areas because it's recognized that commercial
16 residential feeders have a higher minimum demand,
17 especially a daytime demand.

18 And further, because we're using
19 inverters that are already UL certified, the need to
20 use minimum load as a screening criteria for
21 anti-islanding really is -- has limited value.

22 So distribution feeders, the minimum

1 load, and -- and it can vary from feeder to feeder.
2 So this is sort of a generic number -- is
3 approximately 15 percent. And so the screening of
4 15 percent is also, therefore, a very conservative
5 value.

6 And so the recommendation is to -- to
7 move to a higher screening level or utilize the -- the
8 minimum daytime load, right, especially for solar.
9 Most people, their minimum load is at nighttime. But
10 with the -- with solar it's the daytime minimum load
11 that we're really focused on.

12 This graph is a typical distribution
13 feeder. It does not represent Pepco. So don't --
14 don't take it that as just a typical feeder. And you
15 take the demands of the feeder for every hour in the
16 year, and you sort them so that the top value here is
17 the peak demand of the feeder. And then this would be
18 the minimum demand.

19 And you can see as the -- the graph
20 goes down, most of the time the load on the feeder for
21 most of the period during the year is between 60 and
22 40 percent. The dashed line is more of a suburban

1 non-industrial feeder. Same thing. It's slightly
2 lower. The bottom red line on this graph is that
3 15 percent. And you can see that that's very
4 conservative. It's possible to move that up and still
5 be able to capture or screen for more and more solar
6 interconnects and not have to do the level 1 modeling.

7 This is also not a Pepco feeder. It's
8 just a -- a typical feeder. The -- the point of this
9 is to see that if you looked at the hourly demands
10 over a year from January to December, and the feeder
11 load is going to go fluctuate up and down, and this
12 particular one peaked in the summertime at
13 5.6 megawatts.

14 The minimum load is 23 percent of that
15 peak. But the minimum daytime load is actually higher
16 than that and ends up being 33 percent. So when we
17 look at a feeder, we do need to look at, you know, the
18 entire period of the feeder and try to -- to then pull
19 out the minimum daytime load.

20 And again, Pepco has stated in the
21 earlier presentation, they have the ability to pull
22 out the hourly demands for -- or the hourly usage and

1 therefore the demands of the customers and aggregate
2 those to be able to know what it is on a feeder level
3 as well as on the individual customer level, and
4 therefore below any distribution transformers where
5 the application could be occurring.

6 Another consideration for small
7 generation facilities in 4003, the customer is allowed
8 to request information at the point of common
9 coupling, which is the PCC. Also some people refer to
10 it as the point of -- of interconnect, which we heard
11 earlier, the POI.

12 With a small generator, 20 kW less,
13 than 50 kW, the problem is more on the secondary side,
14 the low voltage side. So information on the primary
15 side doesn't provide as much information.

16 In California in Rule 21, it does allow
17 for customers to ask for a enhanced pre-application to
18 get that data so that they can help themselves to try
19 to figure out what the problems might be beforehand as
20 they're putting in their applications.

21 Or if they're using a third party to
22 help them size the solar on their house, they're going

1 to know on the front end a pretty good idea of what it
2 is they can install if they know the minimum load and
3 the existing transformer size. And possibly the other
4 generation served by the -- the transformer can help
5 in doing their own screening to be able to -- to then
6 accelerate the approval.

7 We heard John Budd talk this morning
8 about modeling and the importance of the input values.
9 And one of the important values is the -- is the
10 voltage. As he stated that ANSI 84.1 has a criteria
11 of 5 percent above and 5 percent below nominal
12 voltage. Nominal voltage is 120 volts. So 5 percent
13 would make it 126 volts; 5 percent below would make it
14 114 volts.

15 So according to that standard utilities
16 can't deliver or should not deliver below 114 volts
17 nor deliver above 126 volts. In the standard 87 --
18 this should be C80 -- C84.1. Sorry about that. We'll
19 correct that slide.

20 In C84.1, it's a utilization voltage.
21 So the appliances that you plug into your outlets are
22 designed to work in this range of voltage. If the

1 voltage is too high, for example, one of the -- if you
2 have incandescent light bulbs, they burn out faster.
3 But you also can damage equipment if you have high
4 voltage above 126.

5 So that's a criteria that's used for
6 utilities and example of good power quality.

7 During minimum load periods for solar,
8 if I put a 8 kW solar on my house, and I go on
9 vacation, right, the -- the solar is still going to be
10 operating and potentially then going to be backfeeding
11 onto the system. And in order for it to backfeed on
12 the system, the voltage at the inverter has to go
13 higher than the utility voltage.

14 And that's where you run -- often run
15 into trouble in the modeling that shows a problem with
16 the inverter because it can not only damage the
17 equipment at my house, but it could damage my
18 neighbor's house. So it's an important criteria.

19 Also, most inverters will have a
20 shutdown if the voltage is -- exceeds a certain
21 amount. That shutdown voltage typically is above 126,
22 but that's something that can occur. The voltage --

1 the inverter is going to want to protect itself as
2 well as the appliances in the home. It just makes
3 sense for the manufacturer of the inverter to do that.

4 And thinking about the voltage rise, an
5 analogy I like to use is the pool analogy. The -- the
6 swimming pool is filled up at a 124, 125 volts here.
7 In order for solar to feed in, the voltage has to be
8 higher for that power to feed in.

9 When we feed a house, we get a voltage
10 drop going to the house. So that's prior to having
11 solar or any kind of DER utility. Designer is worried
12 about the voltage drop and not going below 114 volts.

13 To keep from going to below 114 volts
14 the standard practice is make this voltage high
15 without going over 126, and then you won't have a low
16 voltage. The problem with that is that when we make
17 that pool of water high, we're not left with a lot of
18 bandwidth here to have a voltage rise.

19 Remember our voltage rise is limited to
20 126. So 127 would be too much. And as you put more
21 and more solar on that, that voltage has to go up.

22 And that's also part of IEEE 1547. It

1 says the DER should not regulate this voltage. So
2 that voltage -- the pool is so big compared to a pail
3 of water over here, which is really the solar. It's
4 not going to change the level of the -- of the pool
5 water. But it has to be at that higher voltage level.

6 Now in some of the data responses,
7 Pepco has stated what their starting voltage was. One
8 where feeders, where they have conservation voltage
9 reduction, CVR, that's -- those feeders are set at 122
10 volts. In non-CVR feeders they're using 124.5.

11 So CVR is a technique used by Pepco and
12 other utilities. By lowering the voltage, you reduce
13 the power consumption of consumers. Power is equal to
14 voltage times current. You lower the -- the voltage
15 and in turn will lower the current, and therefore
16 lower power consumption.

17 And so feeders that start at 122 can
18 handle more solar than a feeder that starts at 124.5.
19 And so it -- it really depends on -- on the luck of
20 the draw as to where your house is as to which feeder
21 you're going to be attaching to and then, therefore,
22 what your starting power factor is going to be.

1 So the non-CVR feeders have -- have
2 very limited headroom for that voltage rise, where the
3 exact same house, the exact same solar could be on a
4 circuit that does have conservation voltage reduction,
5 and it will work just fine without concern of the
6 voltage rise.

7 Another part of that modeling is the
8 minimum loads, right. We heard Pepco say that they
9 used a average of the minimum loads of homes. And I'm
10 not sure that I agree with -- with that modeling.
11 And -- and again, it's a different ways of looking at
12 it. It's like saying the average load on a house.
13 Well every house is different.

14 And then when you look at the
15 coincidence of those loads, it's going to be
16 different. And for doing the power flow, especially
17 with the voltage rise, the minimum loads on the
18 transformers are going to be an important factor. So
19 if a transformer serves ten or more homes, what's the
20 minimum load going to be?

21 If my -- if the minimum load happens to
22 be higher, then my solar won't have a voltage rise

1 problem. But if the minimum load is low, then I will
2 have a voltage rise problem.

3 So the -- the minimum -- input of that
4 minimum load is a critical factor in trying to make
5 sure that we can squeeze as much solar into the system
6 while still being safe using a very conservative
7 value, which I -- I have that Pepco hasn't publicly
8 disclosed it that -- that I know of.

9 I've seen it in some confidential
10 documents, but I just don't think that it's -- it's
11 publicly available at this time to be able to
12 understand how exactly the -- the minimum loads are
13 influencing the results of the power flow.

14 Transparency of -- of data. OPC as --
15 as well as many of the other interveners have noted
16 the lack of transparency that when a application
17 fails, it's very difficult for the customer or others,
18 including myself on those that I have reviewed, to
19 understand what the problem is and the need for
20 greater transparency.

21 Today we heard that -- that Pepco is --
22 is showing more transparency. It was kind of hard to

1 read that slide at the scale on my screen, but I --
2 I'd be interested to see that appears to be a -- a
3 good move forward. Just the level of information I
4 think is going to be important.

5 We already know that the standard
6 4005.2 says "The utility shall make available upon a
7 request a copy of the power flow based study for the
8 applicant or -- or the commission."

9 So the key here is that to understand
10 why -- why that it failed, and then therefore, why am
11 I paying for an upgrade? Sometimes I'm having to pay
12 an upgrade or I'm having to reduce the size of my
13 solar to avoid a problem. Was it because of flicker?
14 Was it because of high voltage? What -- what was the
15 reason?

16 And I think that that customers and
17 their suppliers, the -- the folks who are installing
18 the solar and advising them about the use of the
19 solar, need to understand that so that they can help
20 their customers not only in this particular one but in
21 the future, be able to fix those problems.

22 So we think that the -- the power flow

1 should have a list of screens and criteria which, you
2 know, list the -- here's the -- the -- we talked about
3 earlier today, the -- the TIR, the technical
4 interconnection requirement, whether it's a table that
5 has a list of the requirements and a pass/fail. If
6 they pass it, they pass it. If they fail it, what's
7 the number? That's an idea of having a very clear
8 indication of what the cause is.

9 And IREC in their comments had a
10 similar suggestion about using something like the TIR
11 to -- to list the -- the values to have a clear
12 transparency to the consumers.

13 And I believe that was the -- the last
14 of my slides. If anyone has any questions, I'll be
15 glad to try to address those.

16 MR. KOMMINENI: Thank you, Kevin. Just
17 open it up for questions.

18 MR. ADEYEMO: This is Kunle Adeyemo on
19 behalf of Pepco. Mr. Mara, I just wanted to ask if
20 you've had a chance to review Pepco's small NEM
21 petition? Because I believe everything you're talking
22 about is mostly dealing with small NEMs; correct?

1 MR. MARA: That's correct.

2 MR. ADEYEMO: Okay.

3 MR. MARA: Most of my slides were
4 dealing with small, yes, sir.

5 MR. ADEYEMO: Okay. Based on our small
6 NEM petition, do you think that that would do a good
7 job of addressing a lot of the questions that you have
8 raised here since there would be a general -- general
9 fee and then all of these other aspects regarding the
10 upgrades would be -- would be handled?

11 MR. MARA: I'm -- I don't think I can
12 answer that from a position as a representative of
13 OPC.

14 Knia, Do you want to respond to that?

15 MS. TANNER: Sure. Good morning. This
16 is Knia Tanner. Last name is Tanner,
17 T as in Tom, A-N-N-E-R.

18 I think we've had this conversation
19 before, and I think one of our biggest concerns was,
20 especially in the flat rate fee, is making sure it was
21 the right size and -- and the information that Pepco
22 used to come up with that fee and how frequently it

1 would change, and -- and also the issue of passing on
2 the -- some of the difference to all of rate payers.

3 So there was -- there were some -- I
4 don't -- so I guess the -- my answer really is no. It
5 doesn't completely solve the issues that we're having
6 in having a flat rate. And also the slide that we're
7 on right here with transparency of the data and
8 understanding what Pepco is doing in terms of doing
9 these evaluations.

10 It -- that doesn't really answer it at
11 all, especially when you're considering the systems
12 that have been downsized because the District has its
13 climate goals and the proliferation of solar is so
14 important. Like losing even, you know, just one panel
15 over the course of -- you know, one panel per project
16 over the course of the -- of -- over the course of the
17 city over the course of time could have a big impact.

18 So I -- I don't think it quite
19 addresses it. We're glad to see Pepco moving in the
20 right direction, but I don't think it -- it quite --
21 quite gets it.

22 MS. BECKHAM: This is Taylor Beckham

1 from Pepco Assistant General Counsel. Just wanted to
2 go back to, I think, the beginning of your
3 presentation, Mr. Mara, where you indicated that Pepco
4 skips screens listed in four oh oh -- let me make sure
5 I get it right -- 40005. Is -- is that correct, what
6 you -- how you characterize what you understand the
7 process to be?

8 MR. MARA: -- presentation this morning
9 that in some cases they jumped directly into modeling
10 as opposed to using the screening. And so that's what
11 I was referring to.

12 MS. BECKHAM: Okay. Okay.

13 MR. MARA: In -- in my verbal comments,
14 the -- the standard does call for screening, but I
15 believe, as John pointed out, it also provides Pepco
16 with the option to jump into modeling.

17 MS. BECKHAM: Correct. Okay. I just
18 wanted to make sure that that was clear, that the regs
19 do allow Pepco to use a power flow study as it's
20 screening.

21 But do you -- are you aware of any ways
22 that outside of the power flow study that Pepco could

1 use or that are just used in the industry for -- for
2 determining the aggregate generation on a line
3 section?

4 MR. MARA: Well the -- the aggregate
5 generation on the line section is typically taking
6 from utilities facility maps and -- and understanding
7 where they have facilities on their system, whether
8 it's a -- a transformer or a solar panel on the
9 backside of the meter.

10 And -- and oftentimes I find utilities
11 are using their mapping systems to summarize those and
12 that doesn't necessarily require a power flow to do
13 that.

14 MS. BECKHAM: Okay. And then -- and
15 you -- I think you discussed a -- the kind of what
16 your understanding was of the line section. And I
17 think you included fuses; is that correct?

18 MR. MARA: Yes. I mentioned that
19 typically a line section is protected by a fuse or
20 some type of overcurrent protective device.

21 MS. BECKHAM: So I think we just want
22 to clarify that definition. I don't -- I don't -- I

1 think it's Pepco's position, and I invite the
2 technical team to chime in here, that those fuses
3 really don't count, and that the definition of a line
4 section is the portion of the EDC's electric
5 distribution system connected to an interconnection
6 customer, bounded by automatic sectionalizing devices
7 or the end of the distribution line.

8 So I think we just want to clear that
9 and make sure we're all working from the same -- same
10 sheet of music there.

11 MR. MARA: I -- I think that's a -- a
12 better definition. I've just seen other utilities use
13 line fuses, but automatic device is a -- is what the
14 standard says, and I would agree with that.

15 MS. BECKHAM: Okay. And then you
16 talked a bit about the pre-application screening
17 process in California. Are you aware of whether or
18 not Pepco charges a fee for a pre-application screen?

19 MR. MARA: I can say that I am not.

20 MS. BECKHAM: Okay. I think for the
21 record, we do not. Are you aware that -- that that
22 California does charge a fee for their pre-application

1 screens?

2 MR. MARA: I am aware of that, yes.

3 MS. BECKHAM: Okay. I think, John,
4 I -- I think you -- oh, one thing I also wanted to
5 say. I think -- I can't remember which slide, the
6 slide talking about voltage levels. I think we --
7 those voltage levels are not correct. For non-CVR
8 it's 125.5, not 124.5.

9 MR. MARA: Well thank you for that
10 clarification. I -- I took that from a data response,
11 and if I mistyped that, I apologize for expressing it
12 incorrectly.

13 MS. BECKHAM: No, no, no. That's okay.
14 I just want to make sure that we've got it right.

15 And I think that's all from me. Thank
16 you.

17 MR. MARA: Thank you.

18 Brian, I think you had a question.

19 MR. LYDIC: Yeah. Thanks Kevin.

20 Actually on this slide here, I -- I was curious, I
21 think you bring up a great point, you know, that this
22 affects the voltage headroom and -- and you know,

1 there are potentially other operational practices that
2 address the voltage headroom along the feeder.

3 Just curious if you have specific input
4 into how that might be reflected, you know, in -- in
5 your proposal to, you know, provide criteria and
6 whatnot for the power flow analysis. You know, when
7 we were thinking about it, it's easy enough to -- to
8 kind of state the thresholds that you're looking for,
9 like, you know, the -- the ANSI C84.1 range A
10 threshold setting.

11 But in terms of providing data on -- on
12 this type of, you know, input data, I'm curious if you
13 have thoughts. You know, would it be useful for the
14 customers to know that it's just on a CVR feeder or
15 not, or -- or any more detailed information regarding
16 that?

17 MR. MARA: We haven't laid out
18 proposals specifically for this but, you know, one
19 obvious item of information is on the hosting maps to
20 indicate whether it's a CVR or non-CVR feeder would be
21 a way to clearly identify the amount of headroom
22 that's -- that's there for -- for adding solar.

1 Whether or not, you know, Pepco could
2 change their operating criteria and go to 124 instead
3 of 125.5, that has a lot of implications because of
4 how they do their design for the voltage drop on their
5 feeders. So we -- we weren't making any specific
6 recommendation to -- to lower the voltage because of
7 the -- the cascading impacts that may have.

8 MR. LYDIC: Right. Yeah. I was
9 thinking just more -- more in terms of the reporting
10 aspect of it, of what they're doing.

11 MR. MARA: Yeah.

12 MR. LYDIC: Yeah. Thanks for that.
13 And I -- I'll just follow on. It sounds like there's
14 no contention about the -- the line section
15 definition, but we have seen other utilities in -- in
16 other states interpret automatic sectionalizing device
17 to include a fuse.

18 But we've -- we worked with EPRI to try
19 and, you know, define that more clearly as, you know,
20 a recloser type device. So -- but as long as, you
21 know, it sounds like Pepco is already taking that
22 interpretation. So it doesn't sound like it's an

1 issue. That's all for me. Thanks.

2 MR. MARA: All right. Thank you,
3 Brian.

4 MR. KOMMINENI: Thank you, Brian.
5 Next, I have Lonko Tuma.

6 MR. TUMA: Yeah. Hi. This is Lanko
7 Tuma with Pepco DER Engineering. Kevin, this is less
8 of a question, just some information for some of our
9 stakeholders. We are intending to implement a -- an
10 automation for level 1 screening. So this is in lieu
11 to your question about, you know, screening as opposed
12 to power flows.

13 So we should be seeing that in the next
14 90 days for that to be deployed. So that -- that
15 level 1 one would be for applications 10 kW and below.
16 And so we could, you know, use screening as opposed to
17 power flows.

18 MR. MARA: That would be very exciting
19 to see. I know that in -- in Georgia there is -- if
20 it's 10 kW and less, the utility has to interconnect.
21 They don't -- they don't even get screening. So we
22 see that in -- in different jurisdictions. And so I

1 think screening for small ones is a great step forward
2 and look forward to seeing it.

3 John, I think you have your hand up.

4 MR. BUDD: Yep. Yeah. I just --
5 question and clarify. So you talked about changing
6 the level 2 and level 1, 15 percent screen. And you
7 talked about it was originally intended for
8 anti-islanding.

9 I -- I just wanted to clarify that
10 while the inverters do have some of the onboard, these
11 rules do apply to more than just inverters. So you'd
12 have to caveat out somewhere in the regs that it needs
13 to be a certified inverter.

14 If we're going to -- you mentioned
15 something about it not being as critical. It is
16 critical. It just depends on the type of technology
17 that we're working with here. So I just wanted to
18 emphasize that.

19 MR. MARA: No. I -- I agree with you.
20 That's a -- that's a -- a very valid point using
21 rotating machinery as a -- as a DER for example
22 needs -- isn't going to have an inverter and needs way

1 more relaying and -- and more scrutiny for
2 anti-islanding. So yes, I -- I would agree with you
3 that there would have to be caveats to move to a
4 higher level for that anti-islanding screen.

5 MR. BUDD: Thank you.

6 MR. KOMMINENI: I don't see any more
7 questions. So thank you, Kevin, for your
8 presentation.

9 Moving along the agenda, next we have
10 IREC present the power flow. Brian, would you like to
11 bring up the slides?

12 MR. LYDIC: Yep. Trying to share my
13 screen. You might just be seeing the video. Are you
14 seeing the slides right now?

15 MR. KOMMINENI: No. I see the other
16 black screen.

17 MR. LYDIC: Oh.

18 MR. KOMMINENI: Yep. No.

19 MR. LYDIC: Shoot, okay. I shared the
20 wrong thing here. Try that again. All right. How's
21 that?

22 MR. KOMMINENI: This is good.

1 MR. LYDIC: All right, thanks. I'll
2 try to move fast so we can -- so we can try to end on
3 time. You might have already seen our proposal and
4 our power flow comments. I tried to just --

5 MR. KOMMINENI: Sorry to interrupt.
6 Can you spell your name? Yeah. No --

7 MR. LYDIC: Yeah, yeah. Again, Brian,
8 B-R-I-A-N, Lydic, L-Y-D-I-C with Interstate Renewable
9 Energy Council.

10 So I think, you know, Pepco did a great
11 job of -- of looking at the different parameters
12 involved in power flow studies. Don't really need to
13 go over everything, but I tried to just kind of create
14 a -- a bit of an educational presentation on this
15 stuff for folks that, you know, probably non-engineers
16 to -- to understand this a little bit more and to
17 understand perhaps why it's important.

18 So we'll see how much I can get through
19 of this, but if not, you'll have the slides to -- to
20 take a look at. And let me see if I can move along
21 here.

22 So you've kind of probably already seen

1 a part of this, but grid impacts are -- are
2 generally -- fall under the category, one of these
3 four categories. Voltage violations. We talk a lot
4 about thermal violations, protections, and then
5 there's operational flexibility, which can mean a few
6 things, but generally just means the ability to
7 reconfigure a circuit.

8 And so the -- the impacts that are
9 going to be evaluated in power flow or any kind of,
10 you know, DER application are going to be often in
11 relation to these things. And I'll try to hit on some
12 of these. I won't -- I won't go over everything due
13 to the time.

14 ANSI C84.1 has already been mentioned
15 in terms of steady state voltage limits. And then
16 we've got rapid voltage change, which I think John
17 pointed out, which comes from -- there are limits in
18 1547. There's also limits for instantaneous
19 overvoltage, which is kind of more of a protection
20 issue, and then flicker under 1453 typically.

21 And you know, really, we're looking
22 typically at voltage rise. You could also be looking

1 at voltage -- voltage dips as well or dips and swells.
2 And then regulation considerations in -- in relation
3 to voltage regulators.

4 And then load rejection overvoltage and
5 ground fault overvoltage are -- are overvoltage issues
6 that can happen during switching events or are kind --
7 kind of like short-term islanding events that are --
8 typically wouldn't be evaluated in power flow but
9 might have other evaluations related to them.

10 And then just keep in mind that the
11 reactive power functions and potentially -- can -- can
12 have an impact on the inverters or -- or DER's ability
13 to -- to avoid those voltage thresholds or mitigate
14 getting near those voltage thresholds.

15 This is just a -- just a representation
16 of a feeder in terms of voltage level and distance
17 from substation. So you consider the substation on
18 the left here and this is a radial feeder. It
19 could -- as the further you get out under normal power
20 flow conditions where load is flowing towards the --
21 or yeah, power is flowing towards the loads, then
22 voltage would typically drop.

1 And so this is where that, you know,
2 that CVR voltage comes into play in terms of what the
3 starting voltage out of the feeder at the substation
4 would be, whether that's shown as 129 here, but say
5 125.5 or something or maybe lower. And you're trying
6 to maintain that all -- all the loads on that feeder
7 are within the ANSI C84.1 ranges.

8 And then when you start putting DER
9 onto the system, that changes the -- the voltage
10 profile across the feeder. So radially, you can --
11 you can wind up with a voltage rise out towards the
12 end of the feeder when you're pushing power back
13 towards the substation.

14 And so that's when you can start
15 violating that ANSI threshold and you know, typically,
16 is more of an issue at the end of the feeder or at
17 small sections of the feeder where the -- the wire
18 isn't as large but you're feeding a decent amount of
19 power back through there.

20 Just -- oh yeah, I'll just move
21 steadily through here. And then those voltage
22 regulators affect that -- that voltage profile. So if

1 you've got a voltage regulator in the middle of a
2 feeder, which is more often done on rather long
3 feeders -- you'll see them out in the country a lot --
4 then that'll step up the voltage in order to keep that
5 voltage for the last customer within that ANSI C84.1
6 voltage range.

7 Another issue with -- with voltage
8 regulators as I think was mentioned, is potential for
9 reverse power flow through that. The settings for
10 that voltage regulator may determine whether it reacts
11 in the right way to that reverse power flow. It
12 basically just needs to be set up for
13 bidirectionality. And I think Pepco said that they --
14 they will do that change free of cost. I hope I'm
15 quoting that correctly.

16 And then there's voltage dips and sags.
17 I -- I won't go through that too much more, but those
18 are more -- more extreme shorter term voltage changes,
19 and then flicker, which was talked about a little bit
20 before. That's more -- flicker is the perception of
21 lights flickering.

22 And -- and so there's parameters in

1 some of the standards around like 1453 around
2 short-term and long-term effects of voltage changes
3 in -- in relation to that perception of voltage -- or
4 perception of light flicker that we want to try to
5 avoid.

6 And then there's load rejection
7 overvoltage. Again, this one is more almost a
8 protection-related issue in a way because it depends
9 on a breaker opening. So typically, if we've got --
10 consider that the substation which isn't shown here
11 would be on the right-hand side and power is flowing
12 back from this large DER solar towards the substation
13 and also feeding all the loads on that system.

14 So if it's feeding back through this
15 breaker and then for some reason that breaker opens,
16 the voltage is going to -- is going to raise up rather
17 high because you've got more power than can feed the
18 loads at -- at that point because you don't have the
19 connection to the larger grid to soak up that power.
20 And that basically just creates a larger impedance
21 path which raises the voltage and that can damage
22 equipment. So we want to make sure that that's taken

1 care of.

2 This is basically taken care of simply
3 by the certification of inverters to IEEE 1547 and
4 1547.1 includes a test for load rejection overvoltage
5 to make sure that under these scenarios, under very
6 high penetration scenarios, that you would never have
7 a damaging overvoltage.

8 So something to be aware of but not
9 really a concern because they're certified for it.

10 And then with ground fault overvoltage,
11 typically more a concern for rotating machines. Same
12 type of situation here. If you're feeding back power
13 towards the substation and the loads, and it
14 doesn't -- it doesn't actually have to be more power
15 or -- or being -- or being backfed to the substation.
16 But just the fact that this generator is -- is feeding
17 loads.

18 And if you do have a fault, a -- like a
19 single line to ground fault out of the three-phase
20 system, just one phase is shorted to ground through a
21 tree or something else, say, then you have fault
22 current that flows through this breaker. The breaker

1 opens because it sees the fault current, and then
2 you've lost the ground source basically.

3 It's a bit of an engineering
4 explanation to -- to get through why this happens.
5 But the -- this -- this connection to ground kind of
6 shifts all the voltages on the three phases and you
7 wind up with the non-faulted phases going very high up
8 to potentially over 138 percent.

9 Actually, it could be 172 percent -- I
10 should probably change this number here -- 130 -- if
11 it only goes to 138 percent, then that -- they have
12 the term "effectively grounded," meaning you're --
13 you're okay.

14 But so you want to make -- basically
15 you have to design the entire ground system of this
16 section of the grid as well as potentially the
17 interface transformer of this unit to avoid voltages
18 over 138 percent so that you don't damage loads.

19 And then inverters act completely
20 differently from rotating machines in this respect,
21 and the loads actually affect the ability to be
22 effectively grounded and -- and typically as long as a

1 third of the load is -- is a grounded load, then that
2 provides the grounding necessary for the inverters.

3 And this is kind of a new concept that
4 is still education getting out to utilities in terms
5 of how to evaluate inverters in terms of effective
6 grounding. And IREC will actually have a paper coming
7 out next month that'll -- that'll help collate some of
8 the -- the research on that.

9 And then this is the transient
10 overvoltage limit in 1547 that applies to both load
11 rejection overvoltage and ground fault overvoltage.

12 And then moving on, there's the thermal
13 violations which I think was explained pretty well in
14 Pepco's presentation, that you've got, you know,
15 basically every piece of equipment that the power
16 would flow through needs to be checked to ensure
17 you're not going to exceed its equipment ratings.

18 And we'll just note that there's
19 continuous ratings but also withstand ratings, and
20 there may be emergency ratings as well. Emergency
21 ratings, I -- I don't think are typically looked at
22 in -- in most power flows or studies because you're

1 looking at generally normal conditions. And so you'd
2 be looking at the continuous thermal rating. But
3 for -- for short-term overloads, it's good to know
4 that there are typically higher emergency ratings for
5 those -- those conditions for pieces of equipment,
6 especially conductors.

7 And then, let's see. Yeah. I -- I
8 included backfeeding here. Backfeeding is actually,
9 you know, potentially its own thing to -- to look at
10 depending on what the utility considers is necessary
11 to look at. And -- and Pepco has got some, you know,
12 some unique situations that not all utilities have in
13 terms of looking at reverse power flow. And so that
14 might be considered kind of its -- its own area of
15 evaluation.

16 I won't really go over the conductor
17 ratings any further here.

18 And then there's protection violations,
19 which would be doing a -- doing a protection
20 coordination study. It's typically different from
21 doing a power flow but can be important. Inverters,
22 fault current is not very high. It's not very much

1 different from its continuous output current.

2 So protection issues generally aren't
3 as big of a concern as they would be with a rotating
4 machine. But you -- you don't want to mess up the
5 protection system or cause unintended fault device --
6 protection device operation due to just the normal DER
7 operation or -- or even, you know, operation during
8 faults.

9 Which if -- if things aren't
10 coordinated you might have a fault say on an adjacent
11 feeder and you trip the feeder that the DER is
12 connected to even though it's not the feeder that the
13 fault is on. And so got to just make sure that the --
14 the -- or the protection devices are all coordinated
15 in that manner.

16 And then -- and then typically
17 underprotection is also the grounding of DERs, which
18 is the -- really that ground fault overvoltage
19 scenario that I was talking about before, is typically
20 what's being looked at. And you might be looking at
21 ground fault sensitivity as well.

22 And then island is usually lumped under

1 that protection bucket -- islanding or unintentional
2 islanding is -- is usually lumped under that
3 protection bucket as well.

4 And that, you know, varies widely, I
5 will say, across the country from utility to utility
6 in -- in terms of how they perceive the risk of
7 islanding. Whether there is a risk of islanding with
8 inverters that haven't -- that have active
9 anti-islanding methods already, or whether they apply
10 DTT. And if they apply DTT, what are the parameters
11 and thresholds under which they apply DTT?

12 IREC will have another paper coming out
13 about that pretty soon that might shed some light on
14 what those practices are across the country.

15 And then I probably don't need to go
16 over that one. Then operational flexibility typically
17 dictated by, you know, contingency planning in order
18 to maintain the ability to reconfigure feeders.

19 And so that might mean that, you know,
20 you can only allow so much power up to a point where
21 you need to be able to transfer that power over to
22 another feeder, and that other feeder might be more

1 limited than the one that you're on in terms of its
2 ability to host capacity.

3 This is -- the amount that this is
4 evaluated depends from utility to utility. Often this
5 might only be done in a detailed study and not
6 necessarily in a -- a typical power flow, which is
7 looking at normal conditions. But they might be
8 taking potentially conservative, you know, assumptions
9 about N minus one conditions in order to deal with
10 that -- that possibility without necessarily
11 evaluating it, you know, in detail.

12 So good to know -- good to know what
13 those contingency assumptions are in terms of what the
14 DER is going to be exposed to in the evaluation. And
15 it's just an example of that operational flexibility
16 where you've got two feeders coming out of the
17 substation. There's a tie switch here.

18 And typically, you know, if it's
19 backfeeding the solar system would -- would go through
20 this feeder to the substation, but under a
21 reconfigured state. You might wind up going through
22 this adjacent feeder, and that -- that's got different

1 properties than the feeder that was evaluated in the
2 power flow.

3 And then beyond that, there's some
4 things not mentioned. Imbalance between the three
5 phases in terms of power flow and -- and voltage
6 imbalance. Harmonic distortion. Harmonic distortion
7 is not often looked at in these quick studies.

8 Maybe tap changes, but there may be
9 assumptions about what's allowable in terms of
10 regulators or LTC tapping in order to improve their
11 lifetime so -- so they're not tapping all the time due
12 to changes in solar output and whatnot. But there may
13 be restrictions and thresholds in the power flow
14 analysis that are put in place for that reason.

15 There's short circuit current rating
16 of -- of equipment that's -- that's kind of a
17 protection issue. I just didn't review that one
18 there.

19 And then again, I mentioned reverse
20 power flow. There can be multiple assumptions layered
21 upon them. The only one I heard Pepco talk about was
22 that voltage regulator issue in terms of whether the

1 settings allow bidirectionality or not.

2 But I think another -- another one
3 would be the -- the 40 percent backflow restriction
4 through the substation. Some utilities put a -- use
5 reverse power flow as a restriction for islanding
6 screening. And that goes into the power flow
7 analyses.

8 So all these things that I just talked
9 about are things that, you know, at least the ones
10 that are related to -- to the power flow study itself
11 are things that would go into the power flow study as,
12 you know, input threshold for, you know, flagging
13 whether the system exceeds a certain threshold or not.

14 And then in the end the customer gets
15 the results. And, you know, previously the
16 customer -- it looks like Pepco is -- really glad to
17 see that Pepco is improving the results going to the
18 customer because that's one of our main proposals.

19 But you know, the customer, if they
20 just see that they failed, they have no idea which one
21 of these evaluations failed or what threshold they
22 failed at, or what the assumptions going into that

1 were in relation to, you know, just as an example,
2 which is typical and -- and not the most interesting
3 one. But an example would be the steady state voltage
4 being within 105 percent of nominal or 1.05 per unit.
5 So that's the steady state voltage limit aligned with
6 ANSI C84.1.

7 But if, for some reason, you know, it
8 was a different value than -- that, you know, the --
9 the customer wouldn't necessarily know what -- why
10 they failed or what the -- what the value was.

11 And so what we're proposing here is
12 basically that Pepco would publish in the TIR -- well
13 publish the TIR and -- and that the, you know,
14 generally those requirements would be addressed
15 through advanced inverter working group. And -- and
16 updates would be subject to approval by the commission
17 after an opportunity for public comment just to ensure
18 that, you know, if there's -- if there's a major
19 change to those that if that would, you know,
20 potentially have a large effect on the ability of DERs
21 to connect to the grid.

22 If it's, you know, super conservative

1 and -- and maybe there's reasons to believe that that
2 conservative is -- conservatism isn't warranted, then
3 you know, there'd be an opportunity to weigh in on
4 that before it's published.

5 And that, you know, basically all these
6 studies that I talked about, there would be
7 assumptions in terms of, you know, the inputs to the
8 study and then what thresholds or technical criteria
9 are used for each of the screens or power flows for
10 each of those evaluations. Or if it's a detailed
11 study evaluation aspect, there may -- there may be
12 more of those assumptions and thresholds that that
13 would need to be listed.

14 But the, you know, the idea would be to
15 expose those. They should be harmonized, you know,
16 across the -- the territory we would think. And so,
17 you know, everything -- I'm not going to -- I just
18 listed them here -- but basically everything I talked
19 about before and what Pepco talked about that could be
20 listed in the TIR in terms of knowing what the -- what
21 the inputs are and what the threshold would be or
22 criteria for passing -- for passing that evaluation.

1 So that allows us to, you know,
2 understand, okay, are there any -- any levels of extra
3 conservatism that need to be addressed in order to get
4 to higher levels of -- of DIR penetration? You know,
5 what are the bottlenecks in the system that -- that
6 might be holding projects back.

7 And -- and that can help if we have
8 better reporting of the -- the -- the passing or
9 failing of those systems. And that can help pinpoint
10 places in the system that may be targeted for upgrades
11 or changes in operational practices, whatnot, or
12 changes in interconnection practices in terms of, you
13 know, potentially changing the operation of the DER
14 to -- to avoid those thresholds and -- and avoid
15 having to -- to do upgrades in relation to those
16 thresholds.

17 So then the third part of the proposal
18 there is just to have those detailed screening
19 results. We have language in our model rules related
20 to this that we've brought in here, basically saying
21 that "The utility shall provide the specific screens
22 that the application failed including the technical

1 reason for failure and shall provide the information
2 and details about the specific system threshold or
3 limitation causing the application to fail the
4 screen." It's going to be screen or -- or power flow
5 issue or power flow parameter, however you'd want to
6 say it.

7 And this is pretty general language.
8 This is, you know, what we've used in other states and
9 this could be evolved. It could be -- honestly, it
10 could be more detailed if we wanted it to be more
11 detailed to get into potentially, you know, like the
12 specific items.

13 I don't think that's necessarily
14 needed, especially if the TIRs, you know, are reviewed
15 by the commission and -- and potentially discussed
16 in -- in working group manner in order to get the
17 right elements in there and -- and have the, you know,
18 some sort of harmonized screening results that are
19 used for all customers or at least customers of a
20 certain class that they'd be getting the same
21 information.

22 And you know, that could all be worked

1 up in coordination with stakeholders and hopefully
2 just increase the transparency of the entire process
3 so that everyone understands what's going on and --
4 and what are the pinch points in the system.

5 And that's it. So any questions?

6 MR. KOMMINENI: Thank you, Brian.

7 Thanks for going through this. I'm just going to open
8 it up for questions. All right. There's no questions
9 at this point. I'm seeing none. Thank you, Brian.

10 MR. LYDIC: All right. Thank you.

11 MR. KOMMINENI: Now we are at the top
12 of the hour here. I'm going to quickly switch to my
13 screen and share something the staff has put together.
14 The staff here, we did put together a tracker. I know
15 we have gone through, like, five of these technical
16 sessions at this point, and we have covered two
17 topics.

18 The topic 1 was the interconnection
19 process and timelines, and then we are at the power
20 flow topic right now. We have touched upon multiple
21 topics and issues, and a lot of them were also
22 answered through the compendium and multiple

1 addendums.

2 At this point we are at the junction
3 where we want to decide if we want to go with an
4 interim report or the final report. With that said,
5 we thought -- the staff thought that this will be a
6 good tool to capture the issues. So we put a matrix
7 together. We have different tabs here.

8 First tab is for the topic 1, "Process
9 and Timelines" where we would like the stakeholders to
10 input their specific issues for those topics as listed
11 here. They could add their name and add their
12 specific concern, which is still pending based on all
13 these sessions.

14 That way we could go through a round
15 of, you know, comments and reply comments for those in
16 this spreadsheet.

17 So this will be a good tool for us to
18 either develop the interim report or the final report.
19 And this will provide the solution or the consensus on
20 a specific topic. So this would be the tracker which
21 we are going to be using to develop the final
22 consensus and the report.

1 So that's our recommendation and we
2 will post this in the SharePoint so that folks could
3 start, you know, entering their specific concerns so
4 that we could get some feedback and arrive to a
5 consensus.

6 Any questions on this?

7 MS. BECKHAM: So I think I circulated
8 an email about this last week. The order did direct
9 Pepco to write the technical conference report, and
10 then I think it allows 20 days. I think Pepco has got
11 to write the technical conference report within
12 30 days of the technical conference. Obviously, we've
13 got multiple meetings, so technical conferences.

14 And then I think interested parties are
15 given 20 days to comment on that report. So I think,
16 you know, I -- I think this is a -- a great template
17 to discuss or -- or use towards understanding kind of
18 what we've talked about. But I think it really is
19 Pepco that's going to be writing the final report.

20 I -- I understand -- I think Brian's
21 point was wanting to at least give the commission some
22 level of a update. So I think a status report would

1 be great and maybe this could aid in that. But I
2 think, you know, relating to comments and
3 characterizations of parties' positions, that's
4 probably better for a report, in which case I think
5 that's really what Pepco would be drafting.

6 And if that is in the form of an
7 interim report or in a overall final report, we can
8 certainly talk about that. But I think just based off
9 of the directives in the order, we want to raise that.

10 MR. KOMMINENI: Yeah. Thank -- thanks
11 for bringing that up, Taylor. And I think we would
12 still need that interim report or the final report
13 from Pepco. And this is just a tool for us to get
14 everything and to aid to develop those reports. So
15 any questions on this?

16 So we will include this in the box, and
17 I would also list the timelines by when we would like
18 all the issues to be listed in this matrix, and also
19 the timeline for other folks to provide solutions or
20 their recommendations for these items. So each of
21 those folks could, you know, go into their specific
22 issue and add their, you know, comments or solutions.

1 If your organization is not found here,
2 please do use these stakeholder names where you could
3 update your name and start entering your
4 recommendations. Like I said, this would be a tool to
5 develop the interim report for Pepco or -- and the
6 final report.

7 With that said, going back to the
8 agenda, I know we touched upon the power flow today,
9 and there were only nine questions in the compendium,
10 which was already responded. And I know there were
11 further questions which was responded by Pepco in
12 various occasions.

13 So the next two topics we have is
14 topic 3, which is the small system upgrades, and
15 topic 4, which is the interconnection cost,
16 transparency, and accountability. My understanding is
17 that we touched upon these two topics in topic 1. In
18 fact, the compendium had only one question for those
19 topics.

20 So if -- if folks agree we -- we should
21 be moving on to the -- the topic 5, which is the
22 hosting capacity. So I would like some feedback if

1 you guys have any specific items for topic 3 and 4.

2 If not, we could move on to topic 5.

3 MS. BECKHAM: I think you're right as
4 far as topic 4 and cost transparency. We've -- we've
5 talked through that or we -- I know in the compendium
6 we had combined actually topic 4 with topic 1. And so
7 we kind of already touched on that.

8 But for topic 3 I think we would --
9 Pepco at least would appreciate talking more about the
10 small NEM petition that it's put forward, and using
11 that opportunity to talk about that within topic 3,
12 small system upgrades.

13 I think that's really a key filing that
14 we think that, you know, we've heard various positions
15 or maybe not positions, but various, just, thoughts.
16 But I think it would be worth it for us to have a more
17 direct conversation about the small NEM petition, as
18 that's Pepco proposed solution to kind of a lot of
19 this.

20 MR. KOMMINENI: Yeah. We do agree with
21 that. And so in that case we will -- the next session
22 would be on the topic 3, and Pepco could present

1 their, you know, topic on this topic.

2 And then, like I said, we still -- we
3 are going to be using this tool which I just shared to
4 track any concerns. If you have any further concerns
5 or questions or things which need to be resolved,
6 please include it in the tracker. That way we can
7 keep that moving.

8 So with that, I think the next meeting
9 would be scheduled for the first Tuesday, which falls
10 on July 1st. I think we will keep it in the same time
11 from ten to twelve. Does anyone have any issues with
12 that date?

13 MS. BECKHAM: The only thing about
14 July 1st, I know I'm not going to be here, but that
15 doesn't mean that we have to move on account of me,
16 but that is a big vacation week. And I -- I think it
17 might be better if we do July 8th or the -- the week
18 of July 8th.

19 MR. KOMMINENI: Okay. Does July 8th
20 work for folks? If not, we will --

21 MS. RENTZ: That won't work for me.
22 Also, can we clarify whether -- what small system

1 upgrades means in topic 3? Like what size are we
2 talking about there?

3 MR. KOMMINENI: That would be level 1,
4 I believe.

5 MS. RENTZ: It says level 1 and 2, but
6 level 2 obviously --

7 MR. KOMMINENI: Yeah. Level 1 and 2.

8 MS. RENTZ: -- goes above small
9 systems.

10 MR. KOMMINENI: -- or

11 MS. BECKHAM: For the small -- the
12 small NEM petition is related to 20 kW and below. But
13 understanding that level 2, I think, encompasses -- I
14 think it encompasses systems larger than 20 kW. But I
15 think -- I think that's, you know, there's -- we're
16 still -- we'll still see residential systems in
17 level 2. And so I think talking about those NEM
18 systems that come through level 2 should be included
19 in that conversation.

20 MS. RENTZ: Right. So are we talking
21 about residential systems 20 kW and below?

22 MS. BECKHAM: I don't want to -- no. I

1 don't -- I don't want to confine us to that. That is
2 what our small NEM petition is about. But happy to
3 talk about other upgrades that are within level 2 as
4 well.

5 MS. RENTZ: So we're going all the
6 way -- like any system that -- so that includes crafts
7 and all that as well? Sorry. I just want to clarify
8 what it's about.

9 MS. BECKHAM: I mean I don't want us to
10 get too -- maybe because the power flow study is
11 delineated by that 50 kW, so maybe going there. I
12 think -- why don't we take that back. I don't want us
13 to -- because I'd like to talk to the team and talk
14 through where we're looking at things, because I don't
15 want to just say, you know, this is specific for
16 something 20 kW when we -- it might be able to be
17 beneficial to something that's like 30 kW or something
18 like that.

19 MS. RENTZ: Yeah.

20 MS. BECKHAM: So can we get back to you
21 on that?

22 MS. RENTZ: Yeah, of course. I mean it

1 could -- you could try defining it as systems that are
2 eligible for level 1 review but can get kicked up to
3 level 2, which is what happens to those residential
4 systems when they require distribution system
5 upgrades.

6 I mean that's -- that would make sense,
7 you know, for -- as far as I -- how I think about
8 things. But yeah, I'll leave that to you guys.

9 MS. TANNER: This is Knia Tanner from
10 OPC. I just wanted to chime in on that conversation.
11 When we put together our position, level 2 was
12 included because of the very fact that Nicole just
13 mentioned, being moved from level 1 to level 2 when it
14 was determined by Pepco that the systems required
15 upgrades.

16 So I think we're -- and I'm fine if
17 whatever we want to talk about, but that was the
18 initial request.

19 MR. KOMMINENI: So in this case, who
20 wants to present for the next session? If you can
21 provide your material prior to the meeting. And I
22 will include this in my email, too. So that way we

1 have the information prior to the meeting.

2 MS. BECKHAM: Sorry. I'm talking to
3 three different people at once. Can you say what you
4 just said one more time, Dillip? Sorry.

5 MR. KOMMINENI: No. In addition to
6 Pepco, if other folks want to present on this topic, I
7 would like to get the material prior to the meeting.

8 MS. BECKHAM: Okay.

9 MS. TANNER: I'm sorry. What was
10 the -- what's the -- the topic that we were going to
11 do for the next meeting?

12 MR. KOMMINENI: It would be the
13 small -- small system upgrades. It's level 1 and
14 level 2.

15 MS. BECKHAM: I'm also getting kind of
16 a scheduling point here. Are we possibly able to do
17 Thursday the 10th of July?

18 Nicole, I don't know if that'll work
19 for you, but we've got -- we might have a lot of
20 conflicts on the Pepco side.

21 MS. RENTZ: Yeah. I'm -- I'm going to
22 be out of town that whole week, but the next week,

1 maybe the 16th. I could also do -- what -- what
2 was -- what was the -- the week of July -- sorry.

3 MS. BECKHAM: It's -- a July 4th week
4 is a heavy vacation week as well.

5 MS. RENTZ: Right. Yeah. Yeah. Well
6 I'm around that week, you know, obviously except for
7 the Friday the 4th, and then the week after that on
8 the -- the week of the 14th. But it'd be hard for me
9 to participate the 7th through the 11th. And then,
10 yeah, the week of the 21st, yeah. But yeah, just
11 really that week is the biggest problem.

12 MR. KOMMINENI: Why don't we -- why
13 don't we take this offline and see how the schedule
14 works because you know --

15 MS. BECKHAM: That works. That works.

16 MR. KOMMINENI: With that said, I think
17 the last item I have is -- I know we have another
18 educational session which is going to be recorded
19 tomorrow. But Cody Davis from Electric Power
20 Engineering, it's going to be scheduled between 2
21 and 3 p.m. tomorrow. If you can't attend, I think the
22 recording will be still placed in the box for you to

1 view.

2 MS. RENTZ: Can I ask a question as
3 well before we wrap up? So Pepco is writing the
4 technical conference report that they're going to
5 present every policy position that has been presented
6 by all of the parties here and characterize them and
7 all the responses?

8 MS. BECKHAM: The order directs that
9 Pepco prepare a technical conference report --

10 MS. RENTZ: Right, as long as
11 directed --

12 MS. BECKHAM: -- within a certain
13 timeline. So --

14 MS. RENTZ: -- that they file it, but
15 that was before the reconsideration request that CHESA
16 had filed asking that we clarify that the commission
17 was leading technical conferences.

18 MS. BECKHAM: And the reconsideration
19 order clarified that the commission would be
20 setting -- commission staff would be setting the
21 agenda and leading the technical conference reports.
22 But it didn't make any change to its order related to

1 Pepco writing the technical conference report. So I
2 think that's still what stands.

3 What the order does also provide is
4 interested parties a chance to comment on the report.
5 I think given the conversations that we've had here,
6 Pepco is certainly prepared to provide a report on
7 this technical conference, which is to say what we've
8 talked about, you know, kind of the different
9 positions that we've seen from the parties and what
10 Pepco's position is.

11 But I think the parties themselves have
12 all the opportunity to provide their comments and
13 opinions on the technical conference within 20 days of
14 that report.

15 MS. RENTZ: Can we clarify that with
16 the commission is -- if that's what the commission
17 intended with the reconsideration order? I -- I --

18 MR. DAVIS: Yeah. So this is Hunter
19 Davis with the commission. So we -- in the order that
20 was the reconsideration order, we clarified that the
21 commission was leading the technical conferences,
22 presentations by stakeholders, and that the technical

1 report would still be written by Pepco.

2 So Pepco is writing the report.

3 They're going to compile all of the information from
4 all the parties, and then if you have issues with the
5 report then you can file comments and replies. So I
6 think we have a pretty clear setup of how this should
7 be kind of closed out at the end of the process but --

8 MS. RENTZ: Yeah. I just kind of feel
9 like it misses the point of the reconsideration
10 request to have Pepco actually writing the report.
11 And if that -- but if that's what the commission meant
12 with its reconsideration order, I mean that's what you
13 meant. I just think it's inappropriate, actually.
14 But --

15 MR. KOMMINENI: Nicole, probably we
16 could look into it. I know Brian isn't here today.
17 So we -- we could certainly look into what --

18 MS. RENTZ: Okay.

19 MR. KOMMINENI: -- actual needs are.

20 Any other questions before we wrap up?

21 Hearing none. Thank you all. Thanks for joining the
22 call. We'll keep you posted. Thank you.

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(Whereupon, at 12:14 p.m., the
proceeding was concluded.)

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CERTIFICATE

I, AUSTIN K. WHITE, the officer before whom the foregoing proceedings were taken, do hereby certify that any witness(es) in the foregoing proceedings, prior to testifying, were duly sworn; that the proceedings were recorded by me and thereafter reduced to typewriting by a qualified transcriptionist; that said digital audio recording of said proceedings are a true and accurate record to the best of my knowledge, skills, and ability; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this was taken; and, further, that I am not a relative or employee of any counsel or attorney employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.



AUSTIN K. WHITE

Notary Public in and for the

District of Columbia

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CERTIFICATE OF TRANSCRIBER

I, SHAUNA WOOLLEY, do hereby certify that this transcript was prepared from the digital audio recording of the foregoing proceeding, that said transcript is a true and accurate record of the proceedings to the best of my knowledge, skills, and ability; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this was taken; and, further, that I am not a relative or employee of any counsel or attorney employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.



SHAUNA WOOLLEY

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