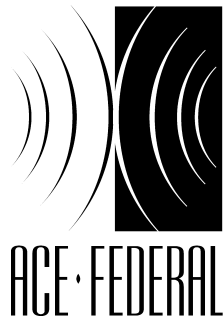# Federal Energy Regulatory Commission

Date: January 12, 2016
Volume:

Case: In the Matter of: PJM Interconnection L.L.C.

1   BEFORE THE

2   FEDERAL ENERGY REGULATORY COMMISSION

3   - - - - - - - - - - - - - - - - X

4   In the matter of   :   ER15-2562-000

5   PJM INTERCONNECTION, L.L.C.   :   ER15-2563-000

6   - - - - - - - - - - - - - - - -X

7   CONSOLIDATED EDISON COMPANY   :   EL15-18-001

8   OF NEW YORK, INC.   :

9   -vs-   :

10   PJM INTERCONNECTION, L.L.C   :

11   - - - - - - - - - - - - - - - -X

12   DELAWARE PUBLIC SERVICE   :   EL15-95-000

13   COMMISSION and MARYLAND PUBLIC :

14   SERVICE COMMISSION   :

15   -vs-   :

16   PJM INTERCONNECTION, L.L.C.   :

17   - - - - - - - - - - - - - - - -X

18   LINDEN VFT, L.L.C.   :   EL15-67-000

19   -vs-   :

20   PJM INTERCONNECTION L.L.C.   :

21   - - - - - - - - - - - - - - - - X

22   PJM INTERCONNECTION, L.L.C.   :   ER14-972-003

23   - - - - - - - - - - - - - - - -X

24   PJM INTERCONNECTION, L.L.C.   :   ER14-1485-005

25   - - - - - - - - - - - - - - - -X

Page 2

1   Room 3M

2   Federal Energy Regulatory Commission

3   888 First Street, Northeast

4   Washington, D.C. 20426

5   Tuesday, January 12, 2016

6

7   The technical conference in the above-entitled

8   matter was convened at 10:00 a.m., pursuant to

9   Commission notice.

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1   FERC STAFF:

2   JASON FEUERSTEIN

3   SHAWN SNOW

4   KEATLEY ADAMS

5   RANDY JOHANNING

6   EDWARD GROSS

7   PETER ROLASHEVICH

8   RON LeCOMTE

9   VALERIE MARTIN

10   VAL TEETER

11   BEN FOSTER

12   KEVIN JONES

13   DOUG MATYAS

14   PRESENTERS:

15   STEVE HERLING and PAUL McGLYNN, PJM

16   FRANK RICHARDSON and TAKIS LAIOS, PJM

17   Transmission Owners

18   MAYER SASSON, Con Edison

19   AMY FISHER, Linden VFT

20   ROBERT WEISHAAR and JOHN FARBER,

21   Delaware/Maryland Commissions/Agencies

22   ESAM KHADIR, PSEG

23   JEFF WOOD, Hudson and Neptune Transmission

24   MARK RINGHAUSEN, ODEC

25   Court Reporter: Alexandria Kaan, Ace-Federal Reporters

Page 4

2   (10:00 a.m.)

3   MR. LeCOMTE: Welcome to PJM's

4   solution-based distribution factor cost allocation

5   method conference. Thank you all for attending.

6   If I could ask everybody who's dialed in,

7   please place your phone on mute so not to interrupt the

8   conference, thanks.

9   As directed in the November 24th, 2015,

10 order and noted in subsequent notices, staff will

11 explore both whether there is a definable category of

12 reliability projects within PJM for which the

13 solution-based DFAX cost allocation method may not be

14 just and reasonable, such as projects addressing

15 reliability violations that are not related to flow on

16 the plan and transmission facility, and whether an

17 alternative just and reasonable ex-ante cost allocation

18 method could be established for any such category of

19 projects. This is a staff-led technical conference and

20 any statements or comments made at this technical

21 conference represent the views of Commission staff and

22 not the Commission.

23   Please note that this technical conference

24 is being transcribed in order to provide an accurate

25 record. For the benefit of those monitoring the

1   conference by telephone or in person, please always

2   state your name, and if you've not already done so, who

3   you will be representing and speaking. Please place

4   your table tag on its edge if you wish to speak, and

5   wait for the microphone. Because they may interfere

6   with room communication equipment, please silence your

7   phones.

8   I would like to begin with staff

9   introductions, noting that different staff may be

10   present at different times of the day, followed by

11   panelist introductions.

12   MR. FEUERSTEIN: I'm Jason Feuerstein with

13   the Office of Electric Reliability.

14   MS. ADAMS: Keatley Adams, Office of Energy

15   Market Regulations.

16   MS. ATHWAL: Moon Athwal, Office of General

17   Counsel.

18   MR. GROSS: Ed Gross, Office of Electric

19   Reliability.

20   MR. ROLASHEVICH: Good morning and welcome,

21   Pete Rolashevich, economist at OEMR East.

22   MR. LeCOMTE: Ron LeComte, OGC.

23   MS. MARTIN: Valerie Martin, Office of

24   Energy Market and Regulations.

25   MR. FOSTER: Ben Foster from the Policy

Page 6

1   Office.

2   MS. TEETER: Valerie Teeter, Office of

3   Energy Policy and Innovations.

4   MR. MATYAS: Doug Matyas, office of OEMR

5   East.

6   MR. JONES: Kevin Jones, OEMR East.

7   MR. GOLDENBERG: Michael Goldenberg, OGC.

8   MR. LeCOMTE: And on that side the panelists

9   could introduce themselves.

10   MR. FARBER: Good morning. John Farber for

11   Delaware Commission Staff.

12   MR. WEISHAAR: Bob Weishaar on behalf of the

13   Delaware Public Service Commission, Maryland Public

14   Service Commission, the Delaware Division of Public

15   Advocate, and the Maryland Office of People's Counsel.

16   MR. WOOD: Jeff Wood with Hudson and Neptune

17   Transmission.

18   MS. FISHER: Amy Fisher, Linden VFT.

19   MR. SASSON: Mayer Sasson, Con Edison.

20   MR. HERLING: Steve Herling with PJM.

21   MR. RINGHAUSEN: Mark Ringhausen with Old

22   Dominion Electric Cooperative.

23   MR. KHADIR: Esam Khadir with the PSEG.

24   MR. RICHARDSON: Frank Richardson with the

25   PJM Transmission Owners.

1   MR. LAIOS: Takis Laios with PJM

2   Transmission Owners.

3   MR. LeCOMTE: Thank you so much. If I could

4   again remind those who have dialed in to please place

5   your phones on mute. We will allow up to ten minutes

6   for opening comments. I will again note that the

7   Commission directed staff to explore whether there is a

8   definable category of reliability projects within PJM

9   for which a solution-based DFAX cost allocation method

10   may not be just and reasonable, such as projects

11   addressing reliability violations that are not related

12   to flow on a planned transmission facility, and whether

13   an alternative just and reasonable ex-ante cost

14   allocation method could be established for any such

15   category of projects. We recognize that there are many

16   issues that could be discussed at this technical

17   conference; please keep your comments on point.

18   In order to efficiently address the

19   Commission's directives, I will cut off questions that

20   go beyond the scope of the Commission's directives. A

21   schedule for post-technical conference comments will be

22   announced in the afternoon session. I just wanted to

23   make one statement for those on call: To the extent you

24   have questions, I understand in the notice that the PJM

25   DFAX CONF, C-O-N-F, designated list had not been

Page 8

1   accessible from outside. That should be corrected. If

2   you get a bounceback on that, please send an e-mail to

3   ron.lecomte@FERC.gov. Thanks so much.

4   I'd like to start with the PJM

5   Interconnection presentation. Thanks.

6   MR. HERLING: I was just going to make a few

7   comments. We had provided a table of the number of

8   projects that fell into various distinct categories

9   based on the nature of the problem they were intended to

10 resolve. Just to be clear, the numbers -- we rolled up

11 sub-elements of projects, if you go back to the

12 individual cost allocation sheets, you will see far more

13 elements that are allocated than the number of projects

14 in that table. And that's because for a given problem

15 the solution may have two or 10 or 15 sub-elements;

16 we're trying to represent the number of projects

17 resolving problems, so. As you can see, the vast

18 majority of projects are related to either thermal

19 criteria violations or voltage problems. It's our

20 belief that the solution-based DFAX is entirely

21 appropriate to deal with the solutions to those types of

22 problems. It works well initially; it works well over

23 time. That really was the benefit of moving to the

24 solution-based DFAX a few years back.

25   We also identified a couple of lesser

1   categories: Operational performance was one of the

2   smaller categories that had a larger number of projects.

3   Those are often related to operational flow issues or

4   operational voltage issues. And, again, we believe that

5   the solution-based DFAX is an appropriate approach to

6   allocating the solutions to those problems. The

7   remaining categories were aging infrastructure, which is

8   a fairly recent one. There, for the most part, the

9   flows are readily represented by the solution-based

10   DFAX, and then we really don't have any issue there.

11   And then you have the stability issues which there

12   really has only ever been one that was not captured in a

13   generator interconnection study. And short circuit.

14   Now, there have been a great many short

15   circuit problems that have been resolved in the RTEP,

16   but in all cases but one they have been resolved by

17   upgrades to the circuit breakers at a particular

18   substation, or they have been part of the solution to a

19   thermal problem where you build a line and the line

20   over-duties the circuit breaker, and as a result the

21   replacement of the circuit breaker is associated with

22   the line project. So there's only ever been one short

23   circuit problem that had to be resolved by something

24   other than the replacement of the circuit breaker.

25   In the short circuit issue and the stability

Page 10

1   issue, again, the benefit of solution-based DFAX over

2   time does represent the flows that are made on the

3   facility that is solving the problem, okay. The initial

4   nature of the problem may not necessarily be related or

5   entirely related on those flows, but over time the

6   evolving use of the facility is well-represented by the

7   solution-based DFAX. One of the challenges -- and as we

8   talk through this today and in the future with

9   identifying the cause of a problem, if you look at the

10   short circuit issue, for example -- there is no one

11   single cause that you can point to to that particular

12   short circuit problem; it's something that kind of

13   evolved over time as a great number of solutions were

14   put in place that had very small impacts on the fault

15   duties at the substations in question. And in a given

16   year we may have 100 projects that are introduced into

17   the RTEP. Each one has a very small impact. We may add

18   generators; there may be generators added in New York

19   that have a small impact on the fault duties. So as we

20   move forward we'll find that it's going to be very

21   difficult to point to a single causal element that you

22   could say on day one is the reason why we had to change

23   out -- in this case not change out a circuit breaker but

24   build a line to redirect fault currents. So over time

25   the solution-based DFAX works pretty well.

1   We can talk about whether on day one the

2   flows on the solution may not be entirely representative

3   of the reason why we had to build a line in the first

4   place. And I think that's really what your question is

5   getting to. The stability is kind of the same

6   situation. On day one the flows on the line of solving

7   the problem are partially representative of the problem

8   but not entirely representative.

9   And at this point I think I'll defer any

10   remaining time and take questions later on.

11   MR. LeCOMTE: Thanks, Steve.

12   If I could again ask somebody who's called

13   in has not got their speaker on mute and it's very

14   disturbing. If you would all check and make sure that

15   your phones are on mute, that would be very much

16   appreciated. Thank you.

17   Okay. PJM Transmission Owners.

18   MR. RICHARDSON: Good morning. Takis and I

19   are representing 16 companies that are PJM Transmission

20   Owners in PJM. The 16 Transmission Owners have a

21   collective responsibility for the design of the current

22   PJM RTEP cost allocation methodology. We have

23   considered the comments submitted by the parties in the

24   technical conference and we continue to support the

25   current cost allocation methodology as the best

Page 12

1   available. We hope our comments this morning and the

2   discussions today will provide more informed context for

3   the Commission to make decisions within. We view the

4   comments submitted as representative of and kind of a

5   microcosm of what happens when cost allocation is not

6   performed using an objective, repeatable measurement of

7   benefits based on accepted engineering principles. When

8   cost allocation is left to concerns, perceptions, and

9   opinions, we have what we have before us in comments

10   today. Where no entity has put forth, as the Commission

11   requested, an alternative, neutral, and objective

12   ex-ante cost allocation method or rational delineation

13   of subset of reliability projects to apply it to.

14   Instead, we have commenters on opposite sides, Delaware

15   and New Jersey in the case of the Artificial Island

16   project cost allocation. We have parties who want to

17   revert to causation principles in allocating for

18   claiming, "I didn't cause the problem. I don't benefit

19   from the solution" in order to put costs on others. We

20   have parties who want to discard the methodologies we

21   have for actually measuring the benefits of reliability

22   projects and exchange it with the measure of economic

23   benefits to put the cost on others. We have parties who

24   want to modify solution-based DFAX calculations to put

25   costs on others. We have parties proposing special cost

1   allocation rules to be applied just for merchant

2   transmission facilities to put costs on others. We have

3   parties proposing a definition of benefits unique to

4   merchant transmission facilities to put costs on others.

5   And lastly we have parties who arbitrarily declare that

6   the solution to this problem is to put all charges to

7   the local zone, charge all zones, charge generators, and

8   do that, and in addition we'll take a rule allocation

9   along with that as well. And all of these propositions

10   are focused on singular projects of concern to the

11   commenters, and all of the propositions are designed to

12   their benefit. This is representative of what happens

13   when projects are looked at in isolation or we revert to

14   causation as the basis for cost allocation.

15   What we do not have in the comments is an

16   alternative methodology ex-ante, that's repeatable,

17   that's an objective measure of benefits that works

18   across geography, across time, and across all types of

19   reliability projects. We do have that in a

20   solution-based DFAX methodology; it's the best method

21   available. It's based on industry-accepted engineering

22   principles, not perception, appearance, or self interest

23   the party's unsupported opinion of "Here's who I think

24   should pay for this." The Transmission Owners offer

25   that specific cost allocations should not be evaluated

Page 14

1   in isolation of all the other integrated components of

2   the PJM tariff schedule flow cost allocation methodology

3   with considerations outside of just the DFAX methodology

4   that result in some parties being exempt from certain

5   costs and other parties paying certain costs. The cost

6   allocation process and methodology has to be taken as a

7   whole, looked at as a whole, and should not be attacked

8   piece by piece in isolation of each other, project by

9   project, and singling out the DFAX component of the

10   entire cost allocation methodology. We believe attempts

11   to categorize reliability projects differently will be

12   fraught with problems and will lead to more litigation.

13   For a large percentage of reliability

14   projects there are multiple violations and reasons

15   causing the need for the project, as well as future

16   violations that will be mitigated. Time to agree upon

17   and split out the causes of allocations will be

18   subjective, circular in reasoning, riddled with

19   conjecture, and will be argued project by project

20   because each of the projects are unique. Because of

21   this, the Transmission Owners changed the game with our

22   last cost allocation of filing and focused on

23   objectively measuring the use of the facilities to

24   measure for cost allocation, and to put that controversy

25   to an end by going to measuring the use. As the New

1   Jersey parties wisely point out, ultimately every

2   project is for waste, regardless of the cause or the

3   need for the project. The Transmission Owners believe

4   that cost allocation can be perceived as unfair but

5   project by project alterations to the PJM cost

6   allocation methodology is not proper. Change to the

7   cost allocation methodology should be evaluated over

8   long periods of time with a mounting body of evidence

9   over a large amount of projects and as an integrated

10 whole, and not in the context of a single project cost

11 allocation where there will be winners, there will be

12 losers, and there will be losers who will litigate, and

13 that will jeopardize the progress that we have

14 accomplished so far with the cost allocation

15 methodologies in PJM.

16   Solution-based DFAX measures use of the

17 transmission facilities. Some results may look strange,

18 at times benefitting entities and at times not

19 benefitting entities. It is not arbitrary, it is

20 defensible and it's the best method that we have.

21 There's no perfect measure of benefits, nor an

22 alternative, and we should be cautious about making any

23 changes.

24   We look forward to more discussion this

25 afternoon. Thank you.

1   MR. LeCOMTE: Thanks.

2   Presentation on Con Edison, please.

3   MR. SASSON: Thank you to the Commission for

4   bringing this conference to explore two over-arching

5   questions. First, is there a category of reliability

6   projects where the DFAX analysis does not work? Our

7   answer is yes. The DFAX analysis is simply the wrong

8   cost allocation method for transmission projects that

9   are intended to resolve non-flow-based violation and

10   provide non-flow-based benefits. I'll refer to such

11   projects as non-overload projects. The DFAX analysis

12   relies on energy flows, but for non-overload projects

13   such as the Bergen Linden Corridor, or the BLC, to

14   Artificial Island projects, there is no rational

15   relationship between flows and intended beneficiaries,

16   which I will explain.

17   Any flow-based benefits that may result from

18   these and other future non-overload projects are

19   incidental to their intended benefits and their stated

20   purpose. Some parties have argued that it is difficult

21   for PJM to identify which category a project belongs in;

22   that is incorrect. PJM already makes such distinctions

23   today. For example, when PJM filed a cost allocation

24   for the BLC project with the Commission they identified

25   their relief problem as over-dutied breakers, and the

1 fail criteria as short circuit. And when the filed the

2 cost allocation for the Sewaren project they identified

3 the problem as Sewaren damage due to Sandy, and the

4 failed criteria as a piece of criteria. PJM also

5 brought in a matrix in advance of this technical

6 conference, as Steve just mentioned, that devise

7 projects according to their purpose. Clearly, this is

8 something PJM does and can do.

9   On the second question: Is there a just and

10 reasonable ex-ante cost allocation method for

11 non-overload projects? Again, our answer is yes. The

12 Federal Power Act requires cost allocations to be just

13 and reasonable. Among other things, this requires the

14 Commission to make an affirmative finding that costs are

15 at least roughly commensurate with benefits. For

16 non-overload projects, this means adopting a cost

17 allocation method that first and foremost identifies

18 which transmission zones are the projects' intended

19 beneficiaries. Since intended beneficiaries cannot be

20 identified by flows, they must be identified by

21 reference to the intended purpose of the project. As a

22 practical matter: This means allocating the costs of

23 non-overload projects to the transmission zone or zones

24 that benefit by receiving relief from the non-overload

25 issue. Some parties have claimed that this would be a

Page 18

1   violations-based approach; we've gotten that complaint.

2   But that characterization is incorrect and serves only

3   to obscure matters by harkening back to past disputes.

4   Let me be clear: Con Edison is not

5   advocating a violation-based DFAX analysis, period. Our

6   position is that for non-overload projects no DFAX,

7   violations, solutions, no DFAX analysis can apply

8   because there is no rational or technical relationship

9   between the flows and intended beneficiaries. The only

10 justifiable way to identify prospective beneficiaries

11 for non-overload projects is to identify who is intended

12 to benefit, given the project's purpose.

13   I will now discuss a little bit more in

14 depth -- and I do note that in a proposal that is

15 summarized in a couple slides that we have that are out

16 there, you can take a look at -- with respect to the

17 first question, DFAX analysis is the wrong cost

18 allocation method for non-overload projects because it

19 relies on distribution factors which lead to flow-based

20 measures. Distribution factors are the basis to

21 quantify the amount of flow that each individual load

22 contributes to the total flow over a specific line.

23 Distribution factors are multiplied, then, by load to

24 get flow, which are then used for cost allocation. For

25 example, if a load has a distributing factor of two

1   percent, relative to a given transmission line means

2   that two percent of that load flows to that line. But

3   for non-overload projects, there is no rational

4   relationship between the flows and the intended

5   benefits. This makes the use of distribution factors as

6   part of a DFAX analysis a portion of it. For example,

7   the purpose of the BLC project is to address short

8   circuit violations. Short circuits have nothing to do

9   with energy flows; energy flows are the result of

10   customer demand. Short circuits are part of the system

11   disturbances that are the result of generator current

12   that overwhelmed circuit breakers. Because short

13   circuits have nothing to do with energy flows, the

14   intended benefits of fixing a short circuit cannot be

15   measured by flow. The same is true for the Sewaren

16   project. The Sewaren project is intended to rebuild

17   piece of system from super storm Sandy. It is obvious

18   that can be recovered, is not a benefit that can be

19   measured by flow.

20   Finally, the Artificial Island project is

21   intended to enhance stability, not enhance growth. For

22   these and future non-overload projects, the DFAX

23   analysis is the wrong tool to use and using it will

24   necessarily result in cost allocations that are unjust,

25   unreasonable, unduly discriminatory, and not wrought

Page 20

1   with the message of benefits.

2   With respect to the second question, it is

3   important to make one threshold point: Some parties in

4   these proceedings have argued that Con Edison and others

5   had no right to challenge their cost allocations for any

6   individual project so long as the DFAX analysis worked

7   for most projects. We categorically reject that

8   position. The Federal Power Act gives each utility a

9   right to adjust the reasonable cost allocation for each

10   and every project, as well as the unqualified right to

11   challenge any cost allocation that it believes fails

12   this test. To ensure that costs are just and reasonable

13   and at least roughly commensurate with benefits, the

14   cost allocation method for non-overload projects must

15   identify intended beneficiaries. If intended

16   beneficiaries cannot be identified by flow, they must be

17   identified by reference to the intended purpose of the

18   project.

19   For short circuit projects like the BLC

20   project, intended beneficiary is the transmission zone

21   where the short circuit exists. Why? This is because

22   excessive current, if not removed, will result in the

23   physical damage and the physical failure of equipment in

24   that region. This conclusion is supported by two

25   additional points: First, short circuits are usually

1   resolved through the interconnection process and paid

2   for by the interconnecting party; second, as PJM has

3   stated, the typical solution for a short circuit problem

4   is to repair roughly the breaker, not to build a

5   transmission line. This underscores why it is

6   irrational to measure benefits like flows or short

7   circuits.

8   The BLC project became necessary in this

9   case only because higher capability breakers are

10   unavailable. This has been years, this is the first

11   time that this came out. But make no mistake about it,

12   the BLC project is intended to fix short circuits in

13   each serviced territory and not flow. And as PJM

14   recently informed its stakeholders -- this is

15   interesting -- the entire BLC project remains necessary

16   with or without the flow. Clearly, this is for the

17   intended beneficiary. Similarly, storm recovery and

18   other infrastructure projects like the Sewaren project

19   should be allocated to the transmission zone where the

20   infrastructure exists, because clearly that is where the

21   intended beneficiaries are. Indeed, before a state

22   regulator they granted the Sewaren project as its number

23   one priority for post-Sandy substation repairs.

24   Finally, because the systems that are

25   connected across transmission zone boundaries,

Page 22

1   disturbances that creates a stability issue can effect

2   generators in different transmission zones.

3   Consequently, the cost of stability projects, such as

4   the Artificial Island project, should be allocated in a

5   breaker-shared basis to the transmission zones where the

6   stability issues are served. So I note that Con

7   Edison's proposal exactly allocates cost-intended

8   beneficiaries and is easy for PJM to implement. Thank

9   you.

10   MR. LeCOMTE: Thank you, Mayer.

11   Amy?

12   MS. FISHER: Amy Fisher with Linden VFT. In

13   light of what we believe are glaring shortcomings in the

14   PJM open access transmission power Schedule 12 cost

15   allocation process, Linden VFT is pleased with the

16   consent Commission understands the 2013 RTEP cost

17   allocations, which we have protested, may not be just

18   and reasonable. We're in general agreement with Con

19   Edison that benefits of project which do not address a

20   need for increased power flow should not be measured by

21   proxies based on relative power flow. Several of the

22   2013 RTEP projects addressed local short circuit

23   violations in the central portion of the utility load

24   zone by rerouting the current, among additional

25   substations. Whether those substations also

1   interconnect at or near Linden VFT will determine

2   whether Linden VFT is allocated costs to resolve this

3   short circuit problem. Had the local utility decided to

4   spread the current to substations within its own load

5   zone, Linden VFT would be allocated fewer or no costs.

6   Regardless of which additional substations

7   are implicated, the short circuit problem will be

8   resolved. However, the cost allocation will

9   dramatically change. If the utilities plan calls for

10 work at the Linden VFT interconnection point, a

11 significant portion of the cost for the project could be

12 shifted to Linden VFT even though Linden VFT received no

13 benefits to offset those costs. Another 2013 RTEP

14 project is a repair of an existing substation following

15 damages caused by Hurricane Sandy, the Sewaren project

16 which Mayer referred to. It, too, was planned to permit

17 the local load serving entity to fulfill its ratepayer

18 obligations, and the TO criteria project was not needed

19 to address reliability, market efficiency, or public

20 policy requirements.

21   A revision to Schedule 12 as has been

22 proposed would be helpful if it clarified the different

23 types of transmission expansion projects may require

24 different proxies to determine project benefits. By the

25 way, Linden VFT reads Schedule 12 to require

Page 24

1   differentiational ready, but PJM disagrees. However,

2   even if so modified, Schedule 12 would not be a valid

3   ex-ante approach to cost allocations, at least to the

4   extent applied to us. Ex-ante cost allocations formulas

5   can simplify cost allocation determination as to

6   expense, but they are only justified to the extent that

7   they produce results which are fair. Under relevant law

8   that means cost allocations which are roughly

9   commensurate with benefits received. Application of an

10   ex-ante formula in a way that violates that standard

11   means the ex-ante formula is wrong, even if the formula

12   may often work as intended. A potentially responsible

13   payers' concern is an indication that the ex-ante

14   formula may not be producing results that are roughly

15   commensurate with benefits. It should be taken

16   seriously, not trivialized.

17   The Northern New Jersey project clearly

18   provides significant local benefits, far more

19   significant than the undocumented powerful advantages

20   which are presumed to accrued on the Linden VFT. The

21   cost allocation mistake is not outweighed by the value

22   of an ex-ante formula because knowing beforehand that

23   the formula will produce legally invalid results will

24   only lead to bigger problems following the application

25   of the formula. However, the load serving entities

1   remain unwilling to concede that the grand bargain which

2   they collectively agreed to in 2012 does not work, at

3   least in some cases. The Commission was told at that

4   time that the resulting ex-ante formula, which is

5   referred to as you know as the solution-based DFAX,

6   employs use of a transmission upgrade as a proxy for the

7   benefits of that upgrade, and that this rule would

8   always, always produce cost allocations which were

9   roughly commensurate with benefits.

10   In fact, under Schedule 12, in order to

11   produce a roughly commensurate result the solution-based

12   DFAX results only become cost allocations after

13   application of savings rules. The one percent de

14   minimis netting and nesting rule and the related

15   gross-up provision, which we've talked about. These

16   effectively allow the LSEs to limit their contributions

17   to projects outside their own load zone. Thus the

18   ex-ante formula is not due to equal statuses as you have

19   heard, but used as a proxy for benefit except when that

20   would not make sense for LSE. Such a formulation might

21   pass muster if it were not for the fact that the savings

22   rule significantly discriminate against Linden VFT and

23   similar parties, and therefore provides none of the

24   consensus-driven planning and coordination value which

25   the Commission associates with ex-ante rules. What this

Page 26

1   ex-ante formula is able to do is permit the load-serving

2   utilities to calculate in advance the ability they will

3   have to offload the cost of their upgrades onto other

4   parties and to design those upgrades to take advantage

5   of the arrangement.

6   To be clear, the most well-intentioned LSE

7   has incentives in the application of Schedule 12. An

8   LSE expects to flag transmission concerns, plan the

9   solution, and add the resulting project to its rate

10   base. It can also eliminate ratepayer concerns if the

11   project costs are assigned to other system users. The

12   claim by the PJM and the LSE's that the PJM Schedule 12

13   cost allocation methodology worked well is over stated.

14   As we have indicated, it is not 95 percent of the

15   allocations that work just fine, but rather when you

16   calculate only those projects that were used, that

17   solution-based DFAX was used to cost allocate, you end

18   up with 74 projects -- seven of which were completely

19   allocated to the local load zone and therefore not

20   contentious -- and 60 of those 74, 81 percent, are the

21   subject of protest. In addition, litigation sought by

22   the western LSE's in 2005 resulted in a major revision

23   to the previous ex-ante methodology, which presumably

24   everyone thought was fine at the time, as recently as

25   2012 and that case has still not been fully resolved.

1   PJM's prevailing view is that there are no

2   bad projects, only bad cost allocations. And it takes

3   no responsibility for cost allocations; it merely

4   applies the formula given to it by the LSE's. However,

5   divorcing project selection from cost allocation is bad

6   policy because separating the question of what to build

7   from the question of who benefits and pays for an

8   upgrade also eliminates important checks and balances

9   for assessing the overall need for and timing of the

10   specific projects. Under the PJM TO, cost allocation

11   information with respect to a proposed project does not

12   release until the project has been sent to the PJM Board

13   for approval. Failure to consider cost allocation in

14   project selection means that more efficient and cost

15   effective have no objective meaning. It is nonsensical

16   to state that a larger regional project is less costly

17   than a series of smaller local projects without

18   considering the question of less costly for whom. An

19   RTEP example of how this works in practice is the

20   Bergen-Linden corridor project which includes a new

21   substation for Newark Airport, important locally but

22   without benefit to Linden VFT. Had it been clear at the

23   time of project design and selection that Linden VFT and

24   not the New Jersey ratepayers would be bearing that

25   project cost, questions about benefits received would

Page 28

1   have been obvious. Instead, under the current OATT

2   there is literally no one who considers the cost

3   benefits to Linden VFT of that decision.

4   We can see from the comments of the

5   Artificial Island cost allocation component that they

6   have made the suggestion that all projects be evaluated

7   under economic criteria to try to put some limit on the

8   planning process. Linden VFT contends that the PJM RTEP

9   rule require consideration of these issues already. The

10   regional transmission expansion planning protocol is

11   required to avoid the imposition of unreasonable costs

12   on any transmission owner or any user of transmission

13   facilities. Section of the OATT requires that any cost

14   assigned to an MTF be reasonable. Instead the cost

15   allocation results for the New Jersey project is that

16   890 million out of the total of 1.1 billion are the

17   responsibility of parties other than the LSE is

18   undeniably not just and reasonable. The likely result

19   of this cost allocation will be that the parties who

20   receive the allocations will be forced to relinquish

21   their firm-withdrawal rights. Since the New Jersey

22   projects upgrades are, according to PJM, still

23   necessarily -- as Mayer pointed out -- they will be paid

24   for by the load zone in which they are located after

25   all. But the resources -- 1,600 plus megawatts will be

1   lost. This is the vocal minority disparagingly referred

2   to by the New Jersey Board of Public Utility.

3   We remind the Commission that MTF's are

4   different and MTF is not an electric load, it's a

5   transmission device. In Linden VFT's case, it's a type

6   of power transformer. In PJM, an LSE's determination to

7   add a transformer will be studied to determine its

8   effect on the system and costs to address resulting

9   changes will be included as but-for costs. MTF also pay

10   their but-for costs through a generator-like

11   interconnection process. No one suggests that a utility

12   transformer, once incorporated into the grid, should

13   attract ongoing upgrade assessments. Also, MTF is not a

14   traditional load zone, which is user and energy

15   producers; it is simply a device which is power

16   delivered over PJM lines that the tariff rates somewhere

17   else, and in the case of Linden VFT moves it back into

18   PJM from elsewhere as well. The price of power in these

19   regions determine where that power goes. Although PJM

20   must be aware of an MTF's operation of the plans and

21   system, an MTF does not use power in the way that rate

22   payer load does. There appears to be a belief among

23   some parties to these dockets that MTF's are not paying

24   their fair share of system costs when there is a

25   withdrawal of power from Northern New Jersey, and this

Page 30

1 view is wrong.

2   With respect to energy transfers, PJM and

3 NYISO conduct their own optimization procedures under

4 coordinated transaction scheduling, and generators can

5 choose which market to participate in. Linden VFT

6 energy flows are no different. If a Linden VFT customer

7 determines to participate in the New York capacity

8 market, it delists in PJM and doesn't receive capacity

9 payments from PJM. Market forces determine where

10 generation is best allocated and drive price convergence

11 between regions exactly as desired under this

12 Commission's interregional planning principle. The fact

13 that an MTF may facilitate these options for generation

14 does not justify the imposition for cost allocations,

15 which benefit others.

16   So what is to be done? First and foremost,

17 all parties need to recall that cost allocations must

18 always be commensurate with the benefit a party receives

19 and no parties are entitled to be free riders. Projects

20 which have their underlying purpose of allowing an LSE

21 to service load in its zone given the age of existing

22 infrastructure, damage to existing equipment, short

23 circuit currents, and similar upgrades, are more fairly

24 allocated to the load zone which would allow those

25 projects to be assessed by state regulators to determine

1   prudency and cost containment.

2   The LSE's would like to maintain the

3   existing 12 formulation, at least for the bulk of power

4   flow projects where it results to sponsoring loads

5   bearing the bulk of project cost. Subject to review and

6   analysis, Linden VFT main have no objection to those as

7   long as the LSE's are willing to revise the formulation

8   so it provides the same savings benefits to MTF so that

9   incidental benefits are not the basis of cost

10 allocations for them. This means an equivalent de

11 minimis figure which would serve to reduce the

12 facilities for which Linden VFT is responsible, and

13 netting concepts that give it back to MTF peak-load

14 operation, and reasonable determination of the likely

15 sources of the MTF generation, each of which is

16 comparable to existing rules for LSE's. It also means

17 rethinking the gross-up provisions of Schedule 12 which

18 exclusively reallocate costs from beneficiaries to

19 non-beneficiaries. Acknowledgement in Schedule 12 to be

20 made that MTFs are not traditional load zones but are

21 transmission facilities.

22   Linden VFT's facilities needed repair last

23 year. Linden VFT performed that work without any

24 consideration of contribution from other load zones,

25 even though it maintained 330 megawatts of capacity

Page 32

1   transmission injection rights which provide a benefit to

2   those PSEG load zones in the form of additional

3   generation under peak conditions. That's the deal. MTF

4   are called zero revenue recovery parties under the

5   consolidated transmission owners agreement for a reason.

6   But conversely, no MTF can be responsible for

7   maintaining a significant portion of the transmission

8   facilities of another party. We cannot see the benefit

9   of these upgrades to our operations and our customers

10   have confirmed this in our open season solicitation.

11   This has not increased as a result of impending upgrades

12   and our customers will not even provide bids to use our

13   service if RTEP costs are imposed upon them.

14   Finally and very importantly, PJM should

15   accept responsibility for administering its own power in

16   accordance with its terms which requires an assessment

17   of cost allocation in the project selection process,

18   timely and complete information provided to affected

19   parties through the RTEP process, and a reasonableness

20   review of Schedule 12 results. If PJM does not perform

21   these functions, parties will be forced to contest

22   Schedule 12 results at the Commission and in the courts

23   to assure that they meet long-established standards of

24   fairness.

25   Thank you for allowing me to participate and

1   I look forward to questions.

2   MR. LeCOMTE: Thank you, Amy.

3   Bob or John?

4   MR. WEISHAAR: Thank you and good morning.

5   I'm Bob Weishaar, speaking on behalf of the Delaware

6   Public Service Commission, the Maryland Public Service

7   Commission, Delaware Division of Public Advocate, and

8   the Maryland Office of People's Counsel.

9   Artificial Island is an area on the eastside

10   of the Delaware river that is seldom more than 3,000

11   megawatts of nuclear capacity. For close to three

12   decades that nuclear capacity has been operating subject

13   to what's known as the Artificial Island operating

14   guide. In Spring 2013 PJM determined that an RTEP

15   project should be developed to address these stability

16   issues that are currently being addressed via the

17   operating guide. And after an extensive RTEP process

18   involving many competing proposals over a rather lengthy

19   period of time, PJM ultimately settled on a combination

20   of projects to be developed by LS Power, PSE&G, and PHI.

21   The total estimated cost of the project is more than a

22   quarter billion dollars. Of this total cost,

23   approximately 246 million, or 89 percent of the total,

24   is proposed to be allocated just to the Delmarva zone.

25   Of the SBD facts portion of the project, 99 percent of

Page 34

1   that total is proposed to be allocated just to the

2   Delmarva zone.

3   At the Delaware Public Service Commission's

4   request, PJM conducted an economic benefits analysis,

5   essentially the same market efficiency analysis that PJM

6   conducts under Schedule 12, Section B5. That analysis

7   revealed that only 10 percent of a total benefits of the

8   project would inure to the Delmarva zone. This mismatch

9   between an allocation of 90 percent of total project

10   costs and 10 percent of project benefits are why John

11   and I are here today. The state agency has exhausted

12   all options in the PJM stakeholder process. They

13   participated extensively in the TO act: They wrote

14   letters to the PJM Board; they presented proposals to

15   the TOAAC; they had extensive discussions with PJM and

16   individual transmission owners. All of which led us to

17   what we have here today in terms of the record.

18   In looking at the record, I think it's

19   helpful to distinguish between the issues that are

20   uncontested and the issues that are still contested.

21   Uncontested is the fact that Artificial Island is a

22   stability-based project. It is not being developed to

23   address thermal or voltage violation. Uncontested is

24   the fact that approximately 90 percent of the total

25   costs of the Artificial Island project are proposed to

1   be allocated to the Delmarva zone under the existing

2   cost allocation proposal. Uncontested is PJM's economic

3   analysis based on LMP-based energy savings showing that

4   all zones in PJM, with the exception of the Commonwealth

5   Edison zone, will realize at least some economic benefit

6   from the Artificial Island project. The only contested

7   issue is what we do about the gross mismatch between

8   cost and benefits. And of all the parties to the

9   proceeding, only the PJM TO's, and just recently the New

10   Jersey's state agencies, suggest that we just ignore the

11   gross mismatch between costs and benefits, that somehow

12   Artificial Island is a sufficiently flow-based project

13   to fit within the current SBD facts paradigm or that

14   somehow SBD facts will produce rough justice. Neither

15   of the parties state exactly how that will occur in the

16   end.

17   PJM itself recognizes that to perform the

18   proposed cost allocation for Artificial Island based on

19   SBD facts and consistent with Schedule 12 of the PJM

20   tariff, but that equity issues exist. As the PJM Board

21   noted in its July 29th, 2015, letter, it recognizes the

22   valid concerns recognized by Maryland and Delaware and

23   others. And in its words, PJM must follow its tariff.

24   And with regard to the cost allocation provisions

25   applicable to this project, PJM also must respect legal

Page 36

1   precedent in the Atlantic City case, allocating specific

2   rate filing responsibilities between PJM and its

3   transmission owners. Nonetheless, we, the PJM Board,

4   recognize that several parties have appropriately

5   questioned the specific allocation in this case.

6   Accordingly, PJM will continue to provide technical

7   analysis and information to effective stakeholders in

8   order to help FERC with its ruling on this particular

9   cost allocation and its cost allocation rules in

10   general, closed quote. To date, PJM has been helpful in

11   providing information for resolving the state agency's

12   quote-unquote valid concerns and their quote-unquote

13   appropriate questioning; and in that regard, PJM's

14   preconference comments were helpful.

15   As evidenced from the preconference comments

16   and other pleadings in these dockets, the

17   Maryland/Delaware State agencies, Old Dominion, and

18   Eastern Utilities, recognize that a limited exception to

19   SBD facts must exist. Stability-driven RTEP projects,

20   of which there is only one out of more than 1,200 RTEP

21   projects, constitutes a definable category. A cost

22   allocation that aligns with economic benefits is

23   feasible for these projects and is the only outcome

24   that, in our view, would survive judicial scrutiny. A

25   cost allocation based on economic benefits is capable of

1   annual updates, just like the current SBDFAX-based

2   allocation. And in fact PJM tariff Schedule 12 B5

3   already requires PJM to conduct what's known as an LMP

4   benefits methodology for cost allocation for certain

5   other types of transmission projects; we would not be

6   reinventing the wheel. A cost allocation based on

7   economic benefits comports with the objective of ex-ante

8   rules. If and when a project falls into an undefinable

9   category, an economic benefits analysis would be

10   conducted for the project in lieu of the SBDFAX

11   analysis. The process would be objective, the process

12   would be neutral.

13   Our view is that a narrow exception to the

14   SBDFAX rules does not and need not swallow the rule. A

15   DFAX based method may be appropriate for the

16   overwhelming number of projects. So in answer to the

17   Commission's two questions: Yes, there is a definable

18   category; in the case of Artificial Island projects, it

19   is a definable category of one. And in response to the

20   second question: Can we develop an appropriate cost

21   allocation method? Yes, I think you can look to PJM's

22   tariff Schedule 12 Section B5 for guidance on how to

23   approach the economic benefits-based allocation that

24   must occur with respect to Artificial Island.

25   I look forward to further questions, thank

Page 38

1   you.

2   MR. LeCOMTE: Thanks, Bob.

3   Would you know if you would be following

4   your presentation when you want to follow up on that?

5   Thanks.

6   MR. KHADIR: Thank you and good morning

7   everyone. My name is Esam Khadir, I'm from PSEG.

8   Go to slide 2, please. For the sixth time

9   I'm going to let you read slide 2, talking about who

10   PSEG is at your leisure. Go to slide 3, please. As the

11   first question, PSEG believes that solution-based DFAX

12   is just and reasonable and is a superior,

13   non-discriminatory ex-ante cost allocation methodology.

14   Power flow driven versus non-power flow driven is not an

15   appropriate distinction. Tests of underlined projects

16   do not warrant any exceptions. Let the record support

17   correctness of allocations.

18   Slide 4, please. Some parties have

19   suggested that the non-power driven nature of certain

20   violations provide a basis for treating those violations

21   differently. Some of them have singled out stability

22   and short circuit issues as a basis of flow

23   differentiation. There's no reason for distinguishing

24   stability and short circuit issues from voltage issues.

25   The non-power flow distinctions are the fact that the

1   violations is on a facility rather than on a line.

2   However, voltage reactive problems provide examples of

3   violations that are non-power flow driven in nature.

4   Voltage reactive issues are one of the

5   biggest drivers of the RTEP projects in PJM. Flow power

6   violations can be caused by solutions of power

7   flow-driven violations. For example, short circuit

8   problems: The more you build, the more you have short

9   circuit. A lot of the transmissions that you build are

10   regional transmission, which makes the short circuit

11   more than just a local issue. Short circuit instability

12   allocations need to be addressed no differently than

13   voltage or thermal violations. Non-power flow

14   violations cannot be pigeon-holed as localized concerns.

15   If you take a look at voltage, which is on the power

16   flow voltage reactive issue, you see that the project,

17   which was a regional project, is a voltage violation

18   project. Voltage issues effecting east and central

19   interfaces, those are 500 kV interfaces, are also

20   regional. So voltage could be regional. Those are the

21   issues.

22   Artificial Island, go ahead and go to --

23   those are two complexes that have stability concerns,

24   both of them are on the 500 kV system. Short circuit

25   issues: Those issues are caused by new transmissions,

Page 40

1   as well as existing transmission circuits and new

2   generation. The transmission, the new transmission and

3   previous transmission, have short circuit issues

4   regionally.

5   Slide 6, please. Carving out categories

6   from the solution-based DFAX will lead to future

7   reviews. If we take a look at the form project found on

8   question that we're here for today, Artificial Island.

9   The baseline for operational performance project, this

10   is both a system stability and high-voltage reliability

11   issue. I can argue very well that the problem in

12   Artificial Island is a high voltage problem, not a

13   stability problem. Others can argue that is a stability

14   problem, not a high-voltage problem. The BLC project,

15   the baseline reliability project that addresses a

16   variety of reliability violations including several in

17   short circuit BLC projects. There are quite a few

18   thermal issues as well as the short circuit issues. The

19   Sewaren project, this is the project that has aging

20   infrastructure as well as short circuit issues. Again,

21   we can argue which one is which. The next project, it's

22   a baseline reliability project that's driven solely by

23   thermal violations. How would be address that one?

24   Which category are we going to pigeon-hole this one?

25   Slide 7, please. The next project is

1   multiple drivers, as well as single drivers. The

2   projects are not readily and easily categorized as other

3   parties have been.

4   Slide 8, please. Solution-based DFAX is a

5   superior cost allocation approach. PJM has handled this

6   DFAX problem. Problems with violations-based approach

7   include: Unmanageable from project addressing a high

8   number of violations; a local project, we had 53

9   violations to start with. It's unmanageable to come up

10   with the cost allocation based on violation-based DFAX,

11   overly cumbersome approach. Results may not necessarily

12   be repeatable on an annual basis because violations

13   could differ. The violation that you have today, a

14   generator could come in tomorrow and completely remove

15   that violation, or another generator could retire and

16   that violation would go away. To adequately capture

17   future beneficiaries of RTEP project and are not suited

18   for analysis of voltage or other issues such as short

19   circuit or stability because those violations would

20   require use of power flow baseline, and we have to get

21   proxies or surrogates in order to be able to analyze.

22   Selection of proxies would require exercises of

23   engineering judgment and making a lift of an exact time,

24   which basically says that if we're carving out short

25   circuit and stability we get a better allocation with

Page 42

1   violations of allocation, the violation-based DFAX is

2   not going to help because it's not a good or accurate

3   measure.

4   Slide 9, please. Solution-based DFAX

5   provide the non-discriminatory ex-ante approach required

6   under Order No. 1000 while avoiding the problems

7   previously encountered under the violation-based

8   approach. It allocates costs to parties commensurate

9   with benefits of BLC from our approach. It is performed

10   annually and as such captures changes in beneficiaries

11   over time.

12   Slide number 10, please. PSEG has already

13   addressed appropriateness of cost allocation methodology

14   for BLC and a northern engineering project, and the

15   numerous filings in the underlying docket. We are not

16   covering the same ground now, but we do offer this

17   deeper -- regarding the cost allocation for the

18   Artificial Island project. I'm going to go a little bit

19   more into the benefits for the Artificial Island project

20   as it pertained to the Delmarva area where it is the

21   primary beneficiary of artifical island project. If we

22   take a look at the map that we have in front of us, the

23   yellow highlighted system that is the Delmarva area.

24   And a couple things that you can notice there: The only

25   ties to the outside world that Delmarva has are

1   basically those in the North, and the orange or red

2   lines are 500 kV, the greenish blue lines are 210 kV.

3   So if you take a look, there are major interconnections,

4   primary interconnections of the 500 kV at two points,

5   one is the red line and one is blue.

6   Just a to give you a little bit of

7   information on the Delmarva system: It's load is over

8   4,000 megawatts; it's served by two 500 kV transmission

9   lines into two 500 kV stations; and it also has some low

10   capacity to kV lines in the North and one 138 kV

11   transmission line. The Delmarva area has been subject

12   to transmission constraints and congestion in the past,

13   and still does. The Delmarva area has very old

14   generation, over 30 percent of its generation is over 40

15   years old, with a high risk of retirement into the load

16   and environmental regulations that we have today. The

17   amount of generation that we have in Delmarva is less

18   than the amount of load that Delmarva has.

19   If we go to slide 11, please. This slide

20   shows the northern ties of Delmarva with the PJM. You

21   can see a tie from the island, that's the Artificial

22   Island, and another tie from Keeney to Rock Springs.

23   Let's take a look, the length of the tie between Red

24   Lion is 17 miles. The whole area is the Artificial

25   Island area which has about 3,800 megawatts of

Page 44

1   generation. So if you take a look at the next closest

2   station to there, it's either Orchard or New Freedom,

3   New Freedom is about 45 miles, Orchard is about 28

4   miles, you'll see Orchard to New Freedom has PSEG as

5   well as Olympic and both of those companies has a lot of

6   generation in their system, not highly dependent on the

7   two areas as much as Delmarva depending on Red Lion and

8   Keeney. The other ties to Delmarva are the two ties to

9   Linwood in the north and the one with --

10   What are the benefits of Artificial Island

11   project? Artificial Island project adds another

12   high-capacity transmission line into Delmarva, five

13   miles from the nuclear complex with 3,800 megawatts of

14   baseline generation. 3,800 megawatts of baseline

15   generation is more generation than Delmarva. The tie

16   consists of a transformer and two kV line into Delmarva.

17   And the flow line would only be from Artificial Island

18   into the Delmarva area; it's not going to go anywhere,

19   the flow from Delmarva is not going to go from Delmarva

20   to Artificial Island. The upgrade, a little bit closer

21   to the Delmarva load than other loads in PJM's. And

22   with this new five-mile line comes a lot. And it's very

23   clear that that line is only in the Delmarva area, as

24   shown in the solution-based DFAX. The reliability of

25   the Delmarva customers would improve with that line. In

1   a way, if we didn't have that line -- and you look at

2   the electrical diagrams there -- and if we apply the

3   NERC minus 1 minus 1 criteria which says you can outage

4   one line, so if we take the Red Lion to Sandow and then

5   you can outage the second line, and then we continue to

6   Rock Springs, you'll have 4,000 megawatts of load and

7   very old unreliable generation in the Delmarva being fed

8   by two 230 kV circuits. This project would provide a

9   very high capacity, some circuits tied to 3,800

10   megawatts of generation.

11   MR. LeCOMTE: Could you get to your

12   conclusion of comments? Thanks.

13   MR. KHADIR: Okay. I wanted to talk a

14   little bit about the market efficiency analysis that the

15   Delaware Commission had mentioned, but I'm not going to

16   have time to do that; I hope that you give me a chance

17   later on to talk about it. The other thing, too, the

18   Delmarva Peninsula has separated from PJM and RPM twice

19   before, once in 2010-2011 and the other one in

20   2012-2013. That means that there is potential for it to

21   split again, which is a huge cost to the Delmarva zone;

22   it happened. Having a line that is run from Artificial

23   Island into Delmarva, it greatly increases the value of

24   the capacity energy transfer limit of the zone, which

25   helps -- avoids the increased-capacity crisis.

Page 46

1   In conclusion, there's no particular

2   certification for -- category cause-out from the

3   solution-based DFAX. In fact, as we saw with the EI and

4   DLS projects, solution-based DFAX methodology cost

5   allocation structure of the stability-driven projects.

6   Thank you.

7   MR. LeCOMTE: Thanks, Esam.

8   I'll note from those on the phones that I

9   believe Esam's presentation -- and I believe we got a

10   presentation from Hudson up next -- are posted on the

11   Commission's website. Thanks.

12   MR. WOOD: Good morning, Jeff Wood. I'm

13   with a company called Power Grid, and Power Grid is the

14   managing member for Hudson and Neptune Transmission

15   Projects.

16   We appreciate the opportunity this morning

17   to speak. And we first say that we agree wholeheartedly

18   with the comments that Amy and Mayer stated previously.

19   Rather than repeating any of that, I want to focus a

20   little bit more on what merchant transmission facilities

21   are and how they're different and what they are and what

22   they're not, what cost allocations have been decided for

23   transmission facilities, and what the economic focus of

24   that is on us if we start thinking about cost-benefit

25   discussions and whether or not solution-based DFAX makes

1   sense for things such as a short-circuit project.

2   Going to my first page -- and I apologize, I

3   don't have page numbers -- but turning the page, each of

4   Neptune and Hudson are 660 megawatt HDDC facilities.

5   They are capable physically of running bidirectional of

6   PJM to New York and New York and PJM, but currently are

7   only approved to run from PJM to New York. Their

8   control HDDC, Neptune has 660 megawatts of firm control

9   transmission rights, Hudson has 320 of firm transmission

10   rights. Those are important figures because that's the

11   basis of which RTEP is allocated to these projects.

12   It's also what allows capacity to be purchased in PJM

13   and sold across the line into New York.

14   Turning the page, I just wanted to give

15   everyone a sense of what Hudson is: The foreground of

16   this photograph is the Hudson converter station, and in

17   the background is the PSEG substation. We connect to

18   the PSEG substation, shown by the yellow line there, at

19   the 230 kV level. We convert that AC from DC in the

20   white building, then we convert it back from DC to AC

21   and we transport it across to New York at 345 kV. It's

22   important to note that we are interconnecting at 235 kV

23   level, and that has to do with a similar upgrade that

24   we're responsible for building which is a Bergen line to

25   230 kV, a portion of an upgrade that was allocated to

Page 48

1   us.

2   To go to the next page. What are merchant

3   transmission facilities? What are we not? We do not

4   have any captive customers; we do not recover our

5   cost-savings base. The only way we recover our cost is

6   from the sale of capacity and energy across the line.

7   So effectively, the only benefits that we can ever

8   garner to give us an ability to recoup cost is something

9   that's going to reduce the price of capacity and energy

10   to PJM or increase the price of capacity of energy in

11   New York ISO, or allow us to sell more energy and

12   capacity across the line at the same spread recognizing

13   that if we seek to increase our STWR we have to make

14   another interconnection request, and if there are any

15   associated upgrades with that we're responsible for

16   those costs.

17   The other thing about a merchant

18   transmission facility is we are economically dispatched.

19   What does that mean and why is that? Because we look

20   like a generator in New York ISO. We are competing with

21   generators in New York ISO. If the price of power in

22   PJM is higher than New York, we don't run. That's an

23   important concept I think to consider when you talk

24   about a flow-based model that's run at peak periods for

25   determining benefits. History has shown we generally

1   don't flow at those peak periods, and in fact Linden VFT

2   flows in reverse, helping to solve the problem that's

3   happening at peak time.

4   Let's skip two pages and go to the cost

5   allocation. I don't think this is in disagreement

6   anywhere, but there were comments made earlier about, is

7   cost causation the right method for cost allocation?

8   So, if we turn to the pages titled "MTF interconnection

9   cost allocations," I wanted to talk briefly about the

10   specifics of Hudson Transmission. In that particular

11   case, we've been allocating slightly more than $300

12   million in upgrade costs for work that was performed in

13   PJM that came out of our interconnection studies to

14   allow us to resolve 320 megawatts of FTWR's. The

15   biggest component of that was the 230 kV Bergen

16   transmission line, which just went operational November

17   30th. We've been using it for less than two months.

18   Now, the tariff required that we pay a hundred percent

19   of the costs on that because it was very easy to

20   determine who caused the problem. That's the tariff; we

21   agreed to it, we knew that going in. If you ran

22   solutions-based DFAX on that, I expect others would show

23   benefits on that line. But that is not the rules of the

24   game, we understand that. But if the cost causation is

25   the method to apply costs to us, it should also be the

Page 50

1   method to apply the RTEP charges.

2   So I would offer to you that if at the point

3   of time that we entered into our interconnection

4   agreement, everything else in the PJM system was frozen

5   the exact same way we are, we can't change without

6   asking for an interconnection upgrade and be responsible

7   to the cost. If everything was frozen, there would be

8   no need for RTEP upgrades. The only thing you would

9   need would be to reinforce and replace old and expiring

10   equipment. All the other RTEP is for expansions and

11   changes that are happening in the system, which we

12   cannot constantly be causing since we're static. We can

13   only change if we come in with another interconnection

14   request.

15   So when I turn to the next page and look at

16   the history of the PJM history cost allocation, at the

17   time we joined the PJM system and made the

18   determination, the business decision, to move forward on

19   a merchant basis, the cost allocation was a hundred

20   percent load ratio share. Hudson was 0.2 percent,

21   Neptune was 0.4 percent of the entire load. We were

22   able to make a reasonable determination at that point in

23   time of: How expensive could it be for us being a

24   vendor of PJM and being responsible for RTEP cost

25   allocations? We could make some absurd assumptions as

Page 51

1 to how broad the costs would be in PJM, and we were

2 going to get very small percentages. That clearly had

3 to change. The 7th Circuit Court said that's

4 inappropriate, Western Utilities were being asked to pay

5 for costs that they were not causing. So there was a

6 shift, there was a shift of violations-based DFAX. I

7 believe that was an attempt to try and allocate the

8 costs to those who caused the problem.

9   Steve made the comment that it's very hard,

10 particularly with short circuit, there's no one specific

11 cost, it's a bunch of people, bunch of things, that

12 could cause the problem. I can tell you one thing for

13 certain that isn't causing the short circuit problem,

14 and that's Hudson and Neptune; there's no way that

15 they're causing the problem. Steve also mentioned that

16 there's a generator in New York that could potentially

17 cause that problem; not across our facilities, we

18 control the line, we don't bring those short circuits

19 across, so there's no way that short circuit problem

20 could be the result of us.

21   I also suggest that you run it without the

22 Con-Ed wheel, without us, without the FTWR's, the short

23 circuit is going to be there, and indeed for the upgrade

24 it is still going to be there. So we could not possibly

25 be the reason from the need to solve that short circuit

Page 52

1   problem. For that reason, the solution-based DFAX flow

2   method is clearly not the appropriate solution for

3   something like a short circuit problem.

4   We did talk about the economics a little bit

5   on the MTF on the next page. On the right-hand side for

6   these PSEG projects of what our cost allocation would

7   have been if it was a hundred percent load ratio share.

8   The two mailboxes are the cost allocation -- the center

9   one is the PJM cost allocation of Con-Ed and the wheel,

10 and then there's was a request made to have that

11 determination made with Con-Ed no longer in the wheel,

12 and it shows the cost allocation to Hudson. The bottom

13 line is my attempt to make some gross estimate and take

14 them for what they are as to what the annual

15 transmission revenue requirement would be that Hudson

16 would be billed from PJM, and that number ranges from 18

17 million to $100 million, annual number. In order to

18 recoup that cost, the price of capacity of PJM would

19 have to decline by $153 per megawatt day to $850 per

20 megawatt day for us to recover those costs that we would

21 be allocated to. I can tell you one thing for certain:

22 The nature of this RTEP cost allocation absolutely makes

23 it impossible to mobilize capital for merchant

24 transmission projects, and it also puts the shareholders

25 of my two companies in a position where they absolutely

1   have to seek any means they possibly can to just try and

2   save their existing investment.

3   Amy brought up, on the next page, some of

4   the concerns; I just want to raise questions about

5   these. From my comments here, you can see that I don't

6   think that solution-based DFAX at all is an appropriate

7   allocation for these type of projects in merchant

8   transmission. But I also just ask general questions.

9   On the one percent de minimis rule, if there's a TO

10   that's shown to use 100 megawatts of the facility and

11   we're shown to use six, why do we get costs and they

12   don't? And then when there's a gross on that, we

13   actually have to take up their cost? That is hard for

14   me to understand the rationale behind that. And then if

15   we look at the netting in situations there and de

16   minimis all mixed together, you could have, say, a 400

17   megawatt facility, maybe Hudson got allocated 5

18   megawatts and TO got allocated 45 megawatts. If that TO

19   is GPNO, I got responsibility of 10 percent of the cost

20   of that project. If that TO is 80 P or PSEG, I now have

21   responsibility for 100 percent of the cost. Someone has

22   to help me understand why my benefits went up 10 times

23   in that second scenario.

24   The last point, and PJM's TO made the

25   comment that we're looking for differentiation in terms

Page 54

1 of how costs are applied to us, and the answer to that

2 is yes, I think it's appropriate. I think we are

3 dramatically different than every other TO and I think

4 we are dramatically different than load. We just

5 function very different, and because of that I'm not

6 sure one methodology will work for everybody.

7   I look forward to a very productive

8 discussion throughout the rest of the day and thank you

9 very much for the time to give my comments.

10   MR. LeCOMTE: Thanks, Jeff.

11   Mark?

12   MR. RINGHAUSEN: Thank you. This is Mark

13 Ringhausen on behalf of the Old Dominion Electric

14 Cooperative or ODEC. I want to thank the Commission and

15 staff for the opportunity to speak to you today. The

16 issues that the Commission has identified for discussion

17 are important for ensuring that the costs for new

18 transmission facilities within PJM are reasonably

19 allocated among companies. Resolving these cost

20 allocation concerns are also important to promoting

21 greater long-term certainty in the greater mechanism

22 used within PJM. ODEC wishes to commend PJM for

23 submitting its matrix well in advance of this technical

24 conference. The PJM matrix provides a very useful

25 framework for discussing the issues identified by the

1   Commission in its November 24th order. By way of

2   introduction, ODEC is a generation and transmission

3   electric cooperative based near Richmond, Virginia,

4   serving 11 distribution cooperative members in Virginia

5   and Delaware. ODEC is generally considered a

6   transmission-dependent utility of PJM, although we do

7   own a small amount of transmission in PJM, and thus ODEC

8   is also a transmission owner. As a PJM transmission

9   owner, ODEC participated in the development of the

10   current PJM cost allocation method, including the use of

11   solution-based DFAX, and ODEC continues to support those

12   methods when they were filed with the Commission.

13   I wish to emphasize that ODEC believes that

14   the solution-based DFAX continues to produce reasonable

15   cost allocations for the overwhelming majority of PJM

16   RTEP projects. Since solution-based DFAX went into

17   effect in early 2013, however, we want to see a small

18   number of RTEP projects where cost allocations produced

19   by solution-based DFAX do not reasonably align with the

20   customers that can be expected to benefit from those

21   RTEP projects. ODEC was directly impacted by these

22   problems of solution-based DFAX when PJM agreed to

23   several RTEP projects with the Artificial Island in New

24   Jersey. The Artificial Island projects are designed to

25   resolve longstanding generators stability issues at Hope

Page 56

1   Creek and Southern New Jersey. Yet over 90 percent, as

2   mentioned earlier, of the estimated $275 million in

3   allocation costs would be allocated to PJM's Delmarva

4   zone. Because ODEC did approximately 20 percent of the

5   load in the Delmarva zone, ODEC will pick up significant

6   portion of the allocation of the Artificial Island

7   project cost under solution-based DFAX methodology. The

8   RTEP projects, for which solution-based DFAX has not

9   produced reasonable results, all fall within a small

10 category of projects that generally do not address

11 thermal- or voltage-based reliability violations. PJM

12 matrix shows that for very few RTEP projects, less than

13 six percent fall within this category. Clearly

14 artifical island falls within this subcategory.

15 Planning in PJM generally is based on reliability

16 planning criteria to detailed power flow models, a.k.a.

17 solution-based DFAX, to an allocated cost of an RTEP

18 projects through a flow-based model process like the

19 DFAX that are logical when the project resolves a

20 thermal or voltage reliability criteria violation

21 identified by these same PJM power flow lines; hence,

22 you have the length between the model and the violation.

23 RTEP projects address the need other than flow-based or

24 voltage violations identified through PJM model process,

25 there is not necessarily any relationship between the

1   need for the upgrade and the customers who

2   solution-based DFAX identifies as derivating by that

3   project.

4   Looking at the Artificial Island project in

5   particular, the primary component of this project is a

6   230 kV transmission line, as mentioned before by

7   Southern New Jersey and the State of Delaware. This 230

8   kV line will help resolve the generator issues at

9   Artificial Island -- that has been clearly stated by

10   PJM -- but is not required to resolve any thermal or

11   voltage reliability criteria violations that might be

12   caused by load growth in the Delmarva zone since there

13   is no violations from the Delmarva zone that need to be

14   resolved by this 230 line. Because the stability

15   problems at Artificial Island are attributed in part to

16   limited transmission pass out of Artificial Island area,

17   it's only been inevitable that solution-based DFAX would

18   simply advocate the cost of a new transmission line out

19   of Artificial Island to the PJM zone in which the new

20   line happened to terminate. So if the line had gone to

21   D.C., the D.C. folks would have been paying the cost; if

22   it went to New Jersey, New Jersey people would have been

23   paying the cost. It's just the fact of how

24   solution-based DFAX is utilized.

25   The result of this solution-based DFAX,

Page 58

1   then, do not signify any significant benefits from the

2   Delmarva zone from the new line that could justify the

3   imposed cost allocation. The only question raised by

4   the Commission's November 24th order is where the

5   categories of projects where solution-based DFAX may not

6   be just and reasonable is fathomable, and ODEC believes

7   it clearly is. The problem with solution-based DFAX to

8   allocate RTEP project cost arising when there is a

9   disconnect between the reliability planning driver for

10   the project and the use of the new project as majored by

11   the solution-based DFAX. In other words, the categories

12   of projects for which solution-based DFAX cannot be

13   relied upon to provide reasonable cost allocations,

14   can't be defined based on planning drivers, which are

15   clearly transparent in the PJM planning process.

16   The PJM matrix itself is evidence that PJM

17   can readily break out RTEP projects by reliability

18   planning drivers. PJM project drivers have also

19   provided the stakeholders in the PJM regional planning

20   process, particularly through PJM's transmission

21   expansion in the advisory community. Looking at the

22   seven reliability projects driver categories included in

23   the PJM matrix, ODEC does not believe that it's

24   reasonable to rely on solution-based DFAX for RTEP

25   projects required by: (1) stability violations; (2)

1 short circuit violations; or (3) storm hardening.

2 Solution-based DFAX may or may not resolve unjust and

3 unreasonable allocations for operational performance,

4 another category in the PJM matrix. And that depends on

5 the nature of the underlying operational problem.

6 Therefore, the example of the operational performance

7 upgrade as identified by PJM under operational problems

8 is not a problem that do not arise to the significant

9 violation; then solution-based DFAX is appropriate.

10 However, if the operational performance upgrades are

11 driven by a non-flow based criteria, such as stability

12 concerns, the project should be considered for alternate

13 cost allocation methodology. That leaves the

14 Commission's question on whether an alternate just and

15 reasonable ex-ante cost allocation methodology could be

16 established for the categories and facilities where

17 solution-based DFAX cannot be relied upon. ODEC is

18 confident that an alternate methodology or methodologies

19 can be developed.

20   For generators stability problem like

21 Artificial Island problem, a potential alternative would

22 be to allocate the cost based on the relative proportion

23 of economic benefits that result from the stability

24 upgrade since the primary benefit of the project is to

25 increase the availability of the generator's output to

Page 60

1   provide capacity and energy in PJM. And I think

2   Mr. Weishaar did a very good job of reiterating the

3   economic benefit of the stability problem in Artificial

4   Island.

5   So I want to thank you and I look forward to

6   further questions and discussions on this topic.

7   MR. LeCOMTE: Thanks, Mark.

8   I want to thank all of the panelists on

9   their presentations and actually for all of those who

10 submitted preconference comments. The staff is going to

11 have some questions based on these comments and the

12 filed preconference comments.

13   I'd originally into the agenda put in a

14 break for 11:40. We're a little bit ahead of that. So

15 I'm going to take a break now; it's not a longer break,

16 just an earlier break. So I'll come back at 11:40.

17 Thanks.

18   (Whereupon a short recess is taken.)

19   MR. LeCOMTE: Okay, we're going to get

20 started again with some questions from the staff.

21   MR. ROLASHEVICH: Thanks, Ron.

22   I've got a couple questions for you guys

23 today. I will identify who the question is to before I

24 ask it. So the first question I have is to the PJM

25 transmission owners. So a lot of the comments that you

1   today have noted that the relative use of the

2   transmission facilities to identify beneficiaries and

3   avoids the difficulties of determining the universe of

4   potential causes. And I think that you had mentioned

5   several times in the presentation this morning that

6   solution based DFAX was "the best that we have

7   available." Do you think that there's a definable

8   category of reliability projects within PJM for which

9   solution-based DFAX cost allocation may not be just and

10   reasonable? And do you think that there's a way that

11   that benefits from the project?

12   MR. RICHARDSON: Thank you. I do not think

13   we believe there's a definable category that should be

14   treated differently. They're all flow-based, everything

15   is flow-based. I think PJM has said, well,

16   solution-based DFAX doesn't always do the best job of

17   identifying the causes of a problem when you apply it,

18   but the test we're using it does not cause. The test

19   we're using is who's actually using the facility? It's

20   a use test. And in an attempt to go back and take

21   specific projects and revert to who caused it is

22   extremely problematic, as many people have noted. The

23   debate will go on forever about what the ultimate cause

24   is and who's responsible, and it will go project by

25   project. It will not be ex-ante in our opinion. So we

Page 62

1   don't think there's a reason for an exclusion in terms

2   of project categories.

3   What was your second question?

4   MR. ROLASHEVICH: I think you actually

5   touched upon both of them. I have one follow-up to

6   that. So you're saying because of the multitude of

7   potential problems for who caused the problem, you're

8   saying that solution-based DFAX was the alternative and

9   that there's no current way to evaluate.

10   MR. RICHARDSON: Right. The only way to

11   evaluate causes is to do it project by project, and then

12   there will be winners and losers depending on how you

13   answer the question about what the cause of what the

14   problem is and try to assign the cost that way. It will

15   be an endless debate, much like we're having here about

16   who should pay. But it's going to be project by

17   project, which is, in our view, not doable. And it's

18   going to hold everything up, there's going to be lots of

19   litigation and there isn't a way to determine in advance

20   who caused the problem and who should pay for it when

21   you have so many different options for the problems in

22   solving and the violations that are occurring behind it.

23   MR. LAIOS: Takis Laios for the PJM

24   transmission owner. One additional thought to keep in

25   mind. Once the project goes into service it's not an

1   additional driver, it's not a factor anymore because a

2   year later, other changes happen to the system, that's

3   going to effect the use of the new project. And

4   solution-based DFAX essentially gets updated annually

5   and will look at those new users of the system and cost

6   allocation accordingly. So causation or what drove the

7   violation of the projects on day one may seem attractive

8   to focus on that, but it very quickly becomes a

9   non-factor.

10   The other thing to keep in mind, we noted

11   today you have thermal voltage short circuit

12   stability-type reasons that are driving a project. But

13   on any given project -- they are all benefits from the

14   projects -- but one of those is going to bubble up in a

15   particular case. In a different situation, a different

16   violation basically will bubble up first, but in the end

17   you end up with similar solutions being placed on the

18   system and really you need to look at the megawatts,

19   whose load, whose megawatts are flowing on that

20   solution? Who's really using that new line? Not any

21   different than putting a new road somewhere and you can

22   see and you can measure what traffic is flowing on that

23   facility. What drove the initial need to put that

24   facility in very quickly becomes a non-factor. And even

25   if you want to focus on it, it becomes very problematic

Page 64

1   again because a project can have multiple drivers and

2   violations that it benefits and providing from a

3   violation point of view, but all of those very quickly

4   diminish over time as the system evolves and the line is

5   there for decades.

6   MR. ROLASHEVICH: Thanks.

7   MR. LeCOMTE: Just to point out, while the

8   Commission Staff has some questions, to the extent there

9   are other comments and questions, I think we'll be

10   directing questions to certain individuals. If you have

11   comments, please place your card out.

12   MR. GROSS: If you're saying that you could

13   theoretically or hypothetically isolate an individual

14   driver, whether or not it's based on the categories that

15   PJM had provided in its matrix, are you saying that

16   there's any way to basically say who caused the

17   violation, if it was a single driver issue?

18   MR. LAIOS: It's basically you're finding

19   yourself backed by violation-backed DFAX and that opens

20   up all the problems that we noted before and the reasons

21   that were filed with this Commission and the reasons why

22   we changed the solution-based DFAX. So no, there is no

23   easy way to link those violations back to a driver. And

24   you do that again you're back to finding yourself in a

25   situation that for how long -- does it mean that driver

1   is then linked to those entities to pay for the project

2   for the 40-year life of the project when you know other

3   uses are going to be made of the project from -- the

4   second day the project goes into service, the system is

5   going to make a varied use of the facilities. That's

6   why it's best to focus on a usage-based system, as

7   opposed to a violation-based system.

8   MR. LeCOMTE: Thank you.

9   Do you have a comment?

10   MR. WOOD: I'd like to comment -- Jeff Wood

11   with Hudson and Neptune -- sort of two comments and

12   questions. (1) I appreciate your question as to: Can

13   you determine who caused the problem? I would also

14   suggest that another question is: Can you determine who

15   definitively hasn't caused the problem? And I think

16   that's important.

17   The analysis of a road is interesting in

18   terms of usage, but the problem with an AC system is I

19   don't get to choose which road I go on. The flows go to

20   the paths of least resistance. So if something like BLC

21   project is built and supply flows shift from the

22   Burgundy line system, am I really getting any benefit

23   from that? I'm getting the exact same product out of

24   PJM, it's just I have a slightly different flow that I

25   didn't have a choice of. That's very different than a

Page 66

1   road. You build a toll road next to a regular road, I

2   get a choice whether I take that toll road or not.

3   MR. LeCOMTE: Thank you.

4   You had a comment?

5   MR. SASSON: Thank you. Those were two very

6   good questions and deserve a comment on the response

7   that you got. I think that PJM TO's would like us to

8   think that the world is divided between violation-based

9   and solution-based DFAX, and that's not the case. Four

10 certain types of projects, like the Commission's

11 question number one, neither are appropriate because

12 both are predicated on identifying beneficiaries by

13 measuring flows on lines. If those flows had nothing to

14 do with the nature of the project and the intended

15 purpose of the project, then there is no rational

16 relationship between those flows and the allocation to

17 the parties based on those flows. Now, I heard this

18 morning from Steven from the PJM TO's that it's really

19 not a good question in the first place that you are

20 asking because, in the first year, the first instant,

21 the first day I think it was mentioned, okay, maybe who

22 caused it or what the nature -- what was the purpose

23 might be important. But after that, as the years go by,

24 the days go by, different people use the facility. So

25 therefore the solution-based DFAX year after year seems

1   like an appropriate way.

2   I'd like to ensure that we understand that

3   that is not the case because that's predicated on the

4   fact that the flows caused the issue. If they didn't,

5   then our ex-ante is don't allocate it based on any DFAX

6   base, allocate it to the parties that benefit from the

7   relief that you got from let's say a short circuit, from

8   the relief that you got from the short circuit project.

9   That would be per zone where that short circuit is. And

10   then year after year you don't charge -- you charge it

11   over 40 years -- but you're charging it to that zone,

12   not to the users of that facility. Because those users

13   of that facility were not users, never caused a problem,

14   had nothing to do with the intended purpose of the

15   problem.

16   Now, it's also mentioned you put in a

17   transmission line, the road that was mentioned, some

18   cars will go on it. Yes, but you're not going to build

19   a road unless you need to offload another road, you have

20   a congestion somewhere, right. And traffic is relieved,

21   slowing down. At that moment you say, I need to build

22   another road to offload that. And that's okay, that is

23   not a short circuit, it is a flow-based thermal overload

24   on one road. You build another road to offload, if that

25   road doesn't offload the original road it doesn't do

Page 68

1 anything, so it better be a road that goes to the same

2 place. And there is then a consistency between the

3 load, serving that load causes the overload and the

4 users of the offloaded facility that are going to the

5 same load. There's a consistency there. In the short

6 circuit case there is no consistency, but we can talk

7 about that more but I don't want to take too much time

8 with my response.

9   MR. LeCOMTE: Thank you.

10   We have another comment?

11   MR. RINGHAUSEN: Thank you. Mark Ringhausen

12 with ODEC. I'd like to respond to the PJM TO's

13 comments. They seem to be focusing in on two different

14 ways to do the allocation, the old way which was

15 violation based, or new way solution based. I think

16 what we have proposed and what the states have proposed

17 is an economic based-type allocation, so we have PJM run

18 their efficiency models to determine who is economically

19 benefitting from that solution, that project, and

20 allocate the costs based on that. We're not proposing

21 to use the violation-based methodology, we moved away

22 from that, solution-based as I mentioned in my opening

23 comments is a better way for most projects to allocate

24 their costs. There are several projects like Artificial

25 Island is not matching the cost in the beneficiaries

1   appropriate. So I think we need to explore an economic

2   analysis of those types of projects like the Artificial

3   Island projects to determine which entities, which

4   zones, are benefitting. Thank you.

5   MR. LeCOMTE: Thank you. We'll note that

6   there will be some economic analysis questions coming

7   further down the line today.

8   Go ahead, PJM TO.

9   MR. RICHARDSON: Frank Richardson with

10   Transmission Owners. My response was going to be on the

11   economic comments, so should I save my comments until

12   then?

13   MR. LeCOMTE: Yeah, hold off for now. Same

14   thing, Esam?

15   MR. KHADIR: Yes, I was going to address the

16   economic comments. Do you want me to go right now?

17   MR. LeCOMTE: Can you hold off for a moment?

18   Thank you.

19   I have a followup question to Mayer, this

20   one is for you. So a lot of the comments seem to

21   indicate that there's a support for a broad

22   categorization of non-flow-related projects that include

23   short circuit, infrastructure, and stability. At least

24   for short circuit and infrastructure reliability issues,

25   as PJM has listed out in its matrix, PJM has listed

Page 70

1   there's a nature of the violation, what is the problem?

2   Are you also indicating that by allocating costs

3   specifically to the load zone that there is where

4   component to the reliability problem?

5   MR. SASSON: Just ask a clarifying question.

6   The "where component" means where it is geographically?

7   MR. LeCOMTE: Yes, that's correct.

8   MR. SASSON: Yes, I would answer

9   affirmatively. Take the short circuit case, okay,

10   normally you mentioned and the PJM TO says that if some

11   breakers become over-dutied, that is they don't have

12   enough capacity to break the short circuit current, then

13   the tariff says the zone must then upgrade those

14   breakers, replace them with higher capacity breakers,

15   and must pay for it. So the answer to your short

16   circuit issue is in that case the zone pays. Now, if

17   those breakers are not available, you have to look for

18   something else. That something else can be a

19   transmission line that takes the function of that

20   transmission line is not to carry flows for some load.

21   The function of that transmission line is to divert some

22   of the short circuit currents away from the breakers

23   that don't have enough capacity and rely on other

24   breakers somewhere else, even to the capacity of other

25   breakers. But as far as this breaker is concerned that

1   is over-duted, now it's not over-duted anymore because

2   it sees less short circuits. That's the function of

3   that line. So it's the function of that line is not to

4   carry flows to some load. The function of that line is

5   to shield short circuits from the breakers that would be

6   otherwise over-duted. And that's why it works; it is a

7   solution.

8   So to answer your question, yes, geographic

9   it's there, where the short circuit is, that's what

10   you're protecting. And in the power system, if the

11   breakers there do not work there will be damage to the

12   equipment in the nearby -- the entire system will not

13   fall apart because other breakers further away will, as

14   a backup, also operate in due time. But there will be

15   damage to equipment there. So who's getting the relief,

16   the benefit? The zone where that breaker is or the load

17   that is using that new transmission? Only because it's

18   there. Additionally, in a power system, any

19   transmission that you build will be used. It's the laws

20   of physics, like water flowing, you put a new canal

21   where water is flowing, it will be used. But that's not

22   the purpose of that line. I hope I understood your

23   question.

24   MR. LeCOMTE: Thank you.

25   Esam, you have a follow-up?

Page 72

1   MR. KHADIR: Okay, normally short circuit

2   issues are not a big problem, it's change a breaker if

3   it's $300,000, $500,000, a million dollars if it's 500

4   kV a nuclear system. That usually goes to the

5   transmission owner, it's no big issue. Sometimes, and

6   that happened once in the time that I've been with PSEG

7   in the PSEG area, we got a huge short circuit problem

8   like the one we had with three stations over EKA. So if

9   we take a look at the short circuit contributions, who

10   are the people contributing to that short circuit, we

11   see a couple of things. We have to maintain a thousand

12   megawatt wheel, and sometimes PS and Con-Ed got together

13   and signed an agreement to deliver a thousand megawatts

14   from Well Wake into Hudson Park. With that agreement we

15   had to build five new circuits that connect PSEG to

16   Con-Ed, two to south and one from Linden to Goethals.

17   We take a look at the problem area we see that the short

18   circuit contributions coming from Con-Ed is about 17 to

19   18 kV, huge amount. We also get some contributions from

20   Well Wake, and we also get some contributions from

21   Linden to this other account.

22   A couple of years, a lot of years later,

23   back in 2010 or so, HTP applied to interconnect the

24   connection to Con-Ed. Studies were made and the studies

25   showed that we need to do two things: One is build a

1   line from Athenia to Birmingham; and the other thing is

2   to close the Hudson bus. By closing the Hudson bus, we

3   added a tremendous amount of short circuit to that area

4   there, almost close to 20 KA. As PJM after doing their

5   analysis, they decided we also need several projects in

6   the area to maintain the reliability of the load in the

7   northern PS, as well as the delivery of the wheel, as

8   well as the delivery of HTP and BFT. Those drove the

9   short circuit contributions, among other things, to over

10   80 KA. There are no breakers that we can use to

11   interrupt 80 KA, so we had to come up with a solution.

12   And the solution that came in, strangely enough, is to

13   isolate the two lines coming in from New York into our

14   northern system. So we built the three 45 kV circuits

15   from Burgundy to feed the two lines going to New York

16   and then we extended it down to Linden. So the solution

17   is to eliminate the short circuit currents'

18   contributions coming in from there. And that's

19   strangely enough what the solution-based DFAX came up

20   to. Solution-based DFAX said that the main beneficiary

21   is New York because that's where the thousand megawatt

22   wheel is, is what uses those new facilities as much.

23   And hardly enough it also addressed the driver or the

24   violation of that line cutting into the contributions

25   coming in. Thank you.

Page 74

1   MR, ROLASHEVICH: One follow-up question to

2   you. First, would you say that we discussed previously

3   this where component geographically would you say that's

4   analogous for a use of certain types of reliability

5   concern?

6   MR. SASSON: For non-flow issues, yes, there

7   is no analogy in that sense. In the sense -- let me

8   make sure I'm answering your question correctly. For

9   non-flow issues -- I may have said the opposite of what

10 I wanted to say, that's why I'm being very careful here

11 to make sure I understand your question. The non-flow

12 issues, like short circuit, like fixing damage due to a

13 super storm and making sure it's better for future super

14 storms, the geographic is the right one in the sense

15 that the problem happens there, where the damage

16 happened the repairs happen, and that is what you're

17 trying to avoid in the future, more damage there. Was

18 that your question?

19   MR. LeCOMTE: Actually, let me see if I can

20 draw an analogy for you and see if it holds. To the

21 extent that the solution-based DFAX identifies

22 beneficiaries based on use -- and I understand your

23 comments that for a short circuit and maybe some other

24 types of light storm hardening that the beneficiaries

25 are local and stay at a theme of beneficiaries -- would

1   you say that because the cause is local that a local

2   allocation may be consistent with an allocation of the

3   beneficiaries?

4   MR. SASSON: Okay. Thank you, Ron. I think

5   it's very clear the answer is yes. The allocation

6   should be local if the problem is local because that was

7   the nature of the problem. And the fact that the

8   problem was not flow-based, which is part of your

9   question. The examples that you put are non-flow based

10   questions. Is that clear? I see you thinking. Maybe

11   I'll say it was a flow overload that happened somewhere,

12   then you could say, well, geographically where did it

13   happen? Right. But is the allocation based to the

14   local zone? And I would say no because that overload

15   was caused by the load, your serving load, more load,

16   you're serving more load, and as you're serving more

17   load then there was an overload. So the load and the

18   overload are related.

19   Now, you apply a solutions-based DFAX,

20   because this as I said before in my opening statement,

21   the solution load offloads the load that would be

22   overload, that's why there's a solution. But it's going

23   to the same load. So there's a consistency, but

24   therefore it's not to the same zone, it's to the zone

25   that caused the overload.

Page 76

1   MR. LeCOMTE: Actually, I'm trying to drive

2   the question to the theme of the solution base, which is

3   the identification of beneficiaries and understanding

4   for what you would contend to be zonal benefits, whether

5   a zonal application would be consistent with the

6   beneficiaries theme of the solution base?

7   MR. SASSON: And my answer is yes.

8   MR. ROLASHEVICH: Thank you.

9   And one follow-up for you, Mayer. As a

10   result of the transmission projects that there are new

11   flows, how do you account in your mind for limiting the

12   cost allocation to a specific zone in which it was

13   caused? How do you account for the new flows?

14   MR. SASSON: Let me go to what I said in my

15   opening remarks, that if a solution to a non-flow based

16   issue is a transmission line, we wouldn't be here

17   discussing it. It's because the solution was a

18   transmission line, it will carry some flows. Is the

19   analogy of a road that will carry some cars if the road

20   is there? Now, are those flows related to the issue

21   that we're discussing, we're trying to address? What

22   was the purpose of building that road? The purpose of

23   that road was so that it could carry cars away from some

24   other road, then measuring the cars that go through it

25   and where they're going, which would be the load, would

1   make sense. But if the purpose of it was not to measure

2   the flows but to divert short circuit currents, how on

3   earth are you going to have a just and reasonable cost

4   of location of measuring those flows when those flows

5   have nothing to do with the reason why you built with

6   the line?

7   MR. ROLASHEVICH: Thank you, Mayer.

8   A couple questions for PJM now, Steve. So

9   looking at the matrix that you provided, I'm just

10   curious how long does PJM track certain types of

11   violations for specifically the categories you have

12   listed here? Is this something that you look at on an

13   annual basis? And is it possible that you have projects

14   that you track over a period of time?

15   MR. HERLING: We only capture the violation

16   when the project is first identified. We don't know

17   back in time to look at when the driver for the project

18   would have changed, that would be virtually impossible

19   to do. We would have to underline the system line by

20   line and try to re-create the past. And there's really,

21   to be honest, no value in doing that to our eyes and it

22   would be a tremendous amount of work. So all of the

23   data in that table is based on the initial events that

24   led to the justification for each project.

25   MR. ROLASHEVICH: Thank you. And a

Page 78

1   follow-up: What is the metric for which you measure

2   some of these reliability issues? I know some of them

3   were measured in KA. Is that accurate?

4   MR. HERLING: That would be the short

5   circuit duty. Thermal violations are based on

6   megawatts; reactive violations, the violation is first

7   identified against the particular voltage criteria, but

8   typically we have to, for purposes of cost allocation,

9   identify a thermal surrogate, either a line or an

10   interface, where the flows are related to the cause of

11   the voltage problem. So when you do the allocation,

12   you're actually looking at the problem in terms of

13   megawatts as well. Stability, there is no direct

14   measurement. We do stability simulations, we will get

15   angular swings on generators. But that's the generator

16   that's experiencing the problem, it's a little bit more

17   difficult to try to relate to megawatt flows online for

18   thermal overloads. And obviously for something like

19   storm hardening there's no metric at all.

20   MR. LeCOMTE: Steve, you mentioned that most

21   of the short circuit-type violations are allocated

22   within the zone. Did you make that comment?

23   MR. HERLING: Well, first of all, most of

24   the short circuit approximation that we identify were

25   identified in the generator queue and assigned to the

1 generators that cause them. Then there's categories

2 that are related to the addition of a transmission

3 facility; for example, you build a new 500 kV line and

4 as a result of the addition of that line you enter duty

5 two substations. The replacement of those breakers

6 becomes part of the project to build the line and is

7 allocated as part of that line. So that's kind of the

8 first group, is generator interconnections; the second

9 would be transmission lines.

10   We then have some number of projects that

11 just pop up over time. And essentially what happens is

12 in any given year we can have hundreds of sub-elements

13 of projects and each one will add a teeny tiny

14 contribution of current flowing to a circuit breaker

15 when we do the circuit breaker calculation. But it

16 doesn't over-duty the breaker. Just as a result of the

17 accumulation of changes you find a circuit breaker

18 over-duty. It's very hard to identify at that point one

19 single causing event.

20   Last year we added -- go back three or four

21 or five years when we were adding hundreds of projects a

22 year. You can't point to one or the other; it's the

23 aggregate of all of them. So next year when we add the

24 circuit breaker, solving that problem is usually less

25 than a million dollars and our allocation rules direct

Page 80

1   that cost to the zone in which the breaker needs to be

2   replaced. So those just kind of catchup to you based on

3   a lot of little changes that have taken over time.

4   MR. LeCOMTE: That's an interesting comment,

5   the accumulation over time of some contribution to a

6   short circuit problem. Can you explain how an

7   allocation mechanism can account for that?

8   MR. HERLING: Well, again, if the cause to

9   the breaker is a few-hundred-thousand dollars or less

10   than a million dollars -- the allocation rules says less

11   than five million dollars it goes into the zone -- so

12   there really is no calculation required. If you wanted

13   to try to attribute all of the causes, it would involve

14   a significant unwinding of -- you have to go back over

15   the last number of years of projects and literally take

16   each one out and see how much the fault duty change on

17   the circuit breaker. You could create a big table and

18   have a few amps there and a few amps there and

19   eventually much more substantial increasing in fault

20   duty, but that happens over time. You don't have

21   breakers that are well under their duty capability, and

22   there will be changes and we'll observe them. And until

23   the breaker is reaching its limit it's not a concern to

24   us. And then, unfortunately, you get to a change, it

25   could be a modest change, it could be a significant

1   change, it makes the breaker over-duty. Is that last

2   element the cause or is it the accumulation of changes

3   over a period of years? Again, when all you're doing is

4   replacing the circuit breaker, we don't care. It's a

5   small cost and it's allocated within the zone.

6   MR. LeCOMTE: Thanks.

7   Mayer?

8   MR. SASSON: Just to follow up on a couple

9   of things that Steve said. Make sure that it's clear,

10   Steve said there is no violation until there is a

11   violation. Those weren't your exact words, but it's

12   close, right? So it doesn't matter that a generator

13   interconnects, causes increased short circuit currents,

14   the breaker is whatever so many KM's capability, it's

15   really at 40 and now it's at 50. Nothing happens. The

16   system will withstand it and nothing happens, nobody

17   gets allocated anything. Now, so incremental over time

18   is not the issue until there is a violation.

19   So now comes the second part of what Steve

20   said, and obviously Steve is a number-one expert on how

21   PJM does things in transmission planning. But I think

22   I'm sort of an expert -- not as much as he is -- on New

23   York. And New York would have the same issues, no

24   violation happens until a violation happens. And over

25   time it doesn't matter, but then it happens that one

Page 82

1   year we have a bunch of projects together, maybe little

2   projects together. But summing them up together they

3   overrun the breaker. In New York, we actually will

4   study those projects together. We have something called

5   the class year, and say if that happens then all of the

6   projects together are responsible for paying for the

7   solution to that violation. So we would not allow New

8   York little projects to come in one year and because

9   those little projects came in now, all of a sudden, we

10   have a violation. Who do we turn to? We have a

11   violation. That would not happen in New York. Is that

12   clear? And I think, I don't know if PJM when it looks

13   at a number of projects together every six months or so

14   I think, maybe that's the moment where they should be

15   looking at are they together causing a breaker going

16   over its capability.

17   Now, the other part that I wanted to comment

18   quickly is this thing about that short circuit currents

19   can go from one ISO to another ISO, from New York to

20   PJM, from PJM to New York. And I think that becomes an

21   interregional issue, and over 1,000 says you can't cost

22   allocate in a voluntary manner interregional costs. But

23   I notice that we may be mixing in the case of Con

24   Edison. Con Edison has the transmission owners of the

25   thousand megawatt wheel and Con Edison has the company

1   that has load in New York City. And as we look, then,

2   from New Jersey to New York City we see Con Edison.

3   Now, it turns out that Con Edison has invested

4   practically all of its generation back in the '90's.

5   So, if any, short circuits are happening because of

6   generation in New York, it's not Con Edison. But I can

7   tell you one thing: The New York Con Edison in 2015 saw

8   that the BLC project was contributing an enormous amount

9   of new short circuit current from New Jersey to New

10 York. And, in fact, it actually overran breakers in New

11 York City. And Con Edison was getting ready to do

12 something about that. And it turns out a generation

13 projects in New York City decided not to go ahead with

14 the project, and that brought the short circuit currents

15 down to the capability of the breakers, and we didn't

16 have to do anything. But that is something you can

17 check short circuit studies that were done for the

18 summer in 2015 by New York ISO, you have that. It works

19 in both directions.

20   MR. LeCOMTE: Thanks, Mayer. I want to be

21 quick here because we're getting ready to break for

22 lunch.

23   MR. LAIOS: Quick observation. A lot has

24 been mentioned/told about the short circuit phenomenon

25 and being associated with circuit breakers. It has

Page 84

1   impacts on other facilities. I think what we need to

2   recognize, why are circuit breakers there that are

3   components that are part of facilities that carry flows?

4   In the end it's a component of the interconnected grid

5   whose purpose is to carry flows. So you can measure

6   again those flows to see who's using those facilities.

7   If you wanted to measure who's contributing to that

8   short circuit in terms of what facilities the circuit

9   breaker is associated with, you could do it. But again

10   you're back to a violation-based calculation, which is a

11   one-time calculation, and you're losing the benefits of

12   a construct that allows you to update the use of such

13   calculation over time.

14   So, again, the caution about going to a

15   measurement that's a one-time calculation and it's only

16   looking at the incremental of the entity that is noted

17   pushes the capacity or the capability of the circuit

18   breaker over the top where there have been other users

19   that contributed to the accumulation of those, that, if

20   you will, eats away at the capability of the circuit

21   breaker to get it to the point that the straw that broke

22   the camel's back, but it's really the accumulated users

23   that contributed to it. So, again, a user's approach

24   would be best because of the violation, the limitations

25   reflected on the violation type construct.

1   MR. LeCOMTE: Thanks.

2   Esam, you have two minutes, please.

3   MR. KHADIR: Two things I wanted to address.

4   Number 1 is the projects that contributed to that short

5   circuit, I wanted to mention it a little bit, or the

6   facilities that contributes to that short circuit

7   problem in northern PS, is basically the interconnection

8   with Con-Ed brings in a lot of short circuit

9   contributions. The closing of the Hudson bus that was

10   done to facilitate HTP connection and delivery from New

11   York that -- and all the projects that PSEG had to

12   construct in order to maintain reliability for the PSEG

13   northern zone load, the delivery and power of

14   transmission and the maintaining the thousand megawatt

15   wheel from New York.

16   The other point I want to make, and I make

17   it really quickly: Mr. Mayer said that, well, the short

18   circuit contributions coming in from New York is

19   actually because of the generation on the New York

20   system, and he is correct. And he also mentioned that

21   those generations that Con-Ed visited those serve the

22   Con-Ed load. And short circuit contributions are a

23   common end from these generations are coming in over the

24   Con-Ed network, facilities, coming in over the Con-Ed

25   PCNG pipes. Thank you.

Page 86

1   MR. LeCOMTE: Thank you.

2   It's time for lunch. I've got 12:32. I

3   still plan on starting at 1:30. If everyone can be

4   quick with their lunch and I plan on starting on time.

5   Thank you so much. On the phone I'm going to leave the

6   phone bank open, so you'll be able to stay online. We

7   plan on starting at 1:30. Thanks so much.

8   (Whereupon a lunch break is taken.)

9   MR. LeCOMTE: Okay, if we can get started.

10   Two things I want to ask: I've been able to turn my

11   volume down on the phone, but the feedback I hear is

12   that people are still either typing away or shuffling

13   papers, and it's disruptive to those that are trying to

14   listen. So please, telephones on mute if you're

15   listening.

16   And the other is for the panelists. I

17   understand that folks on the listen line are having a

18   hard time hearing, so make sure you hold the microphone

19   in front of you. It gets difficult as we speak without

20   the mic in front of us, so if I can ask that we try to

21   remember that as you're speaking.

22   Okay. And I actually wanted to follow up on

23   some of the comments that were made earlier, especially

24   from PJM, and I think the notion of the cumulative

25   effect of some of the contributions to a short circuit

1   concern. And I think that that was helpful. I know we

2   had a little bit of a followup from the transmission

3   owners on the appropriate -- and why the solution base

4   would be appropriate for addressing what seems to be a

5   cumulative problem. I want to see if there's any

6   followup on that.

7   And then I suppose I want to see if I can

8   understand that theory or that -- those comments in the

9   context of a stability problem and whether -- especially

10   as you, Steve, had pointed out -- the notion that many

11   of these are resolved at the generator interconnection

12   analysis, so --

13   MR. HERLING: Sure. And similar to short

14   circuit, but even to a greater degree, every stability

15   problem that we have ever had, to my recollection --

16   actually, there were two others that were identified in

17   the RTEP but they were resolved with very minor

18   adjustments to control devices within the generating

19   station, so they're hardly worth talking about. But

20   every other stability problem that we have ever

21   identified turned up in a generator impact study to the

22   interconnection process. So it's even more skewed

23   toward not turning up in the RTEP.

24   This is clearly a unique situation; whether

25   it will ever happen again is really hard to venture.

Page 88

1   But it's a combination of things which -- I couldn't

2   even begin to dissect everything's that has happened in

3   the last 10 years that may have led us to a situation

4   where we had to balance either the inability to control

5   voltages with the stability of the station, three large

6   nuclear generators, and it would take a lot, a lot of

7   work to back up in time. It's easier to see with short

8   circuit because there are really discrete changes to the

9   grid that add short circuit duty at a particular

10   location with the stability at Artificial Island. It

11   would take a lot of work for us to go back in time and

12   try to identify every change that has taken place in the

13   last 10 years, five years, whatever, and say that made

14   the problem worse, that made the problem a little bit

15   worse. And we haven't attempted to do that, okay.

16   With the short circuit, it would be a lot of

17   work but it would be more straight-forward because you

18   would know what the look for. Transmission lines will

19   add short circuit duty out of location, generators will

20   add short circuit duty out of location.

21   Reconfigurations, Esam talked about closing the bus tie

22   at Hudson, that will clearly add short circuit duty at a

23   particular station.

24   Go ahead.

25   MR. LeCOMTE: Okay, and so that gets us a

1 little bit into the causal, what's causing some of these

2 problems. I think to the extent so we've accepted the

3 solution-based cost allocation mechanism and it

4 identifies beneficiaries through the use of the

5 facilities. So I'm trying to keep us moving in the

6 understanding of beneficiaries.

7   MR. HERLING: That's the challenge, is cost

8 allocation is not supposed to be -- what's the word that

9 you use -- commensurate -- that sounded like a PSE&G

10 person, just to be clear. Roughly commensurate.

11   MR. LeCOMTE: Somebody without the

12 microphone.

13   MR. HERLING: Cost allocation is not

14 intended to be roughly commensurate with use. It's not

15 intended to be roughly commensurate with who caused the

16 problem. It's intended to be roughly commensurate with

17 who benefits, okay. So you have to decide what

18 constitutes a benefit. And obviously use of a facility,

19 there are clearly benefits associated with the ability

20 to use a facility. Now, people have talked about the

21 fact that you don't actually get to chose which facility

22 you put flow on, but the fact that the facility exists

23 and you are able to put flow on it is a benefit.

24   Now, the argument that we used to make when

25 we had violation-based DFAX was that the existence of a

Page 90

1   violation of reliability criteria puts customers at

2   risk; the elimination of the violation is therefore a

3   benefit to those customers. So the argument back in the

4   day was that the people who caused the problem are

5   benefitting because the system is now reliable because

6   we have fixed it, okay. So there are ways to attribute

7   benefit to various things that you can measure, okay.

8   Let's face it, there's lots of other

9   benefits. The general reliability of the entire grid is

10   a benefit, okay. The jobs that a project creates,

11   that's a benefit, but it's not one that PJM is in a

12   position to measure.

13   MR. LeCOMTE: So what do you think is an

14   appropriate way to identify beneficiaries for these,

15   yours was unique, but a stability problem or maybe a

16   short circuit problem?

17   MR. HERLING: Right. I think a lot of

18   people have said some of these things already, so I will

19   characterize it perhaps a little bit differently. The

20   benefits evolve over time, they will change. That's one

21   of the benefits of solution-based DFAX, is the users of

22   a facility change over time. Solution-based DFAX is

23   readily calculated year after year so you can measure

24   those benefits as they change. So the resolution of the

25   problem on day one will -- what's the best way to say

1   this -- that benefit fades over time, okay.

2   If you look at Artificial Island, 30 years

3   from now the stability benefits will probably no longer

4   be there because one or more of those units may very

5   well likely be retired. So the stability problem will

6   have gone, the line will still be there and will still

7   be used and useful.

8   MR. LeCOMTE: And you would say the flows

9   may be significantly different?

10   MR. HERLING: They may or may not but

11   they're readily calculable. The point is that the

12   initial benefit of solving the problem fades over time.

13   So is there a way to calculate the benefits

14   of solving the problem? There may very well be. When

15   you look at a thermal overload, I would argue that the

16   benefit of solving the problem and the uses of the

17   facility are largely the same. The people who cause

18   flow from A to B are the ones who are going to be using

19   the new facility. You build from A to B to solve the

20   problem, it's largely the same. It won't be exactly the

21   same, but it's largely the same.

22   With stability and short circuit, that's a

23   trickier proposition. Number 1, you have to kind of

24   come up with a methodology for measuring who those

25   beneficiaries are, and then you have to figure out a way

Page 92

1   to weight those benefits against the benefits of use.

2   And that weighting will change over time. On day one it

3   may be more toward solving the problem. 30 years later

4   it may be entirely on who's using the facility.

5   MR. LeCOMTE: So if I were to look at the

6   matrix that you've given us, and while I know that there

7   are some stakeholder issues identified for the different

8   groupings that you've provided, that by and large the

9   solution-based is supported for flow-based or thermal

10   and voltage-type reliability concerns. And you've

11   identified several groupings of reliability concerns,

12   okay: The short circuit; the stability-type issues;

13   aging infrastructure. What would you think of

14   identifying beneficiaries for this other group that

15   you've classified in the matrix?

16   MR. HERLING: It would be my position that

17   thermal and reactive I think are perfectly well-handled

18   by the solution-based DFAX. I believe the most

19   operational performance issues will also be well-handled

20   because they're typically either thermally related or

21   voltage related. I think aging infrastructure is very

22   well-handled by solution-based DFAX. So it really gets

23   down to issues where the nature of the problem is

24   different. And short circuit and stability are the ones

25   we've been talking the most about, we have categories of

1   one in each case.

2   But then you get to a situation where you

3   have to decide if you're going to take on wanting to

4   solve this issue for a category that may have one

5   project ever, okay, then you have to figure out how do

6   you measure that benefit of solving the problem

7   initially and how do you weight it against the evolving

8   use of the facility over time?

9   MR. LeCOMTE: Great. I think I've heard

10   from several of the comments on an economic benefit

11   analysis. Give me some comments on that.

12   MR. HERLING: Sure. I don't know that that

13   would apply to short circuit, I would have to think a

14   bit about it. But I'm not sure that it's going to apply

15   to short circuit. For stability there were two market

16   efficiency analyses that were performed. Market

17   efficiency analysis could be used to identify the

18   parties that are affected by the stability of the plant,

19   okay. The dollars themselves, I'm not sure -- it's not

20   a traditional market efficiency problem. If you look at

21   Artificial Island, the likelihood of one of those units

22   being forced off because os a stability problem is very,

23   very small. So the dollars that would actually be

24   realized over some period of time will be small, but

25   they are analytically a good way of pointing to the

Page 94

1 buses and the zones that would be impacted by the

2 stability of the plant. The further away you get, the

3 less market efficiency benefit would be realized, and

4 coincidently the less impact there would be of the

5 stability of the plant.

6   If you look at Atlantic City Electric, which

7 is right where the plant is, or Delmarva of Pico, those

8 are the zones closest, they would have the biggest

9 problem if you had a stability problem. And in the

10 short circuit analysis that was referred to, that's

11 where you see the biggest delta in the LMP's, okay. So

12 there are analytically ways to establish which zones are

13 most impacted by the stability. The challenge again is

14 how much weight do you put on that when you compare it

15 to the use of the facility that has been built to

16 resolve the problem.

17   MR. LeCOMTE: Right. So I know in the PJM

18 tariff there are provisions for economic cost

19 allocation. Maybe you can tell me what you think the

20 basis would be for looking at economic benefits of

21 reliability projects?

22   MR. HERLING: The provisions that are in the

23 tariff today or the operating agreement are based on

24 projects that are justified on the basis of market

25 efficiency. There are no provisions to say if you have

1   a line, form a liability, and it happens to save a

2   million dollars in congestion, that's a coincidental

3   benefit, and there is no provision to include that in

4   the cost allocation for the facility. That's not to say

5   that there couldn't be. The challenge is how much is a

6   million dollars of congestion worth compared to

7   eliminating a thermal violation of NERC reliability

8   standards? There is no direct relationship, so you just

9   have to pick one and it will be arbitrary.

10   If a project is approved by the PJM Board

11   because by itself it satisfied the market efficiency

12   standards, then there's a method for allocating those

13   costs. And that's pretty straight-forward, and it is

14   based on where the LMP's are reduced. And if there are

15   RPM benefits, there are various ways of looking at the

16   benefit of the project. But today there is no way to

17   just grab those kind of coincidental market efficiency

18   benefits and attribute them to the cost allocation.

19   MR. LeCOMTE: Okay. I note there are quite

20   a few cards up, so I'm going to let some other people

21   respond to that.

22   I do want to remind people that -- and I

23   appreciate all the comments that have been filed and the

24   comments that we've heard today, and I think we have a

25   very good understanding of your perspectives. I'd like

Page 96

1 to make sure we stay on the point we're trying to

2 understand here, so with that as my -- let's try to stay

3 on point.

4   Mayer, I think you were first, and then I'm

5 not quite sure, I lost -- but I know Mayer was first on

6 his card.

7   MR. SASSON: We'll all have a chance.

8   MR. LeCOMTE: Hopefully we'll all have a

9 chance, yes.

10   MR. SASSON: I just want to say that we

11 think that these issues are rare, and we've already said

12 why they're rare. It's very rare that a short circuit

13 is being resolved with a transmission; it's very rare

14 that storm hardening is being resolved with a

15 transmission; the transformer -- so given that these are

16 rare, we try to answer the two questions that you asked

17 in a very direct manner. These are rare but they're in

18 a different category, right, there's no overloads here.

19 And if they're rare and they're in a different category

20 and we know where they are, what happens, what Peter was

21 saying the "where," the zone, that's where you should

22 cost allocate it.

23   And so you have an easy answer to both

24 questions, something that is very rare. Now the

25 question has come up: What happens in the future years?

1   Well, the future years are really not an issue because

2   this line was not built for that purpose. If we're

3   going to look at future years we should look at every

4   single line in the system, who's using that line. So I

5   don't think that that is the issue, I think the zone and

6   we're done with it.

7   MR. LeCOMTE: I am going to let some others,

8   but let me just ask: Okay, to you Mayer, so you have

9   indicated where. Then tell me what you think about

10   where as it relates to stability-related issues?

11   MR. SASSON: In my opening remarks I said if

12   we have a stability violation it's because Steve, these

13   people, Steve's people, analyzed a stability situation

14   and said, "Ah, if something happens, we have in the

15   system, some units, even if it's rare, some units are

16   going to lose stability." We have a stability

17   violation, there's a rule that says when that happens

18   you got to do something about it. Now, sometimes you

19   can just do controlled, which is what he said. It

20   should have been caught in the connection process, he

21   said. So very rare you're faced in -- maybe never comes

22   up, as Steve said -- you got the transmission issue to

23   address the problem. But once you got a transmission

24   line to address the problem, then where are the units

25   that felt the stability issue? In the zones where the

Page 98

1 units that felt the stability problem, that's where you

2 should go. And that's the "where."

3   MR. LeCOMTE: Thanks.

4   Okay. Jeff or Amy?

5   MR. WOOD: Just I hate to go back a little

6 bit. I want to talk about short circuit and comments

7 Esam made right before we broke. I want to clarify the

8 record a little bit. Esam's comments were on the short

9 circuit that Hudson was causing the problem. And I

10 would acknowledge that when we were studied we caused

11 some short circuit problems, but we paid for all the

12 solutions at that time to resolve the problem. We spent

13 roughly $30 million to entirely build out a new

14 substation for them at the 80 Kd level, probably

15 creating a little bit of headroom in there. And this is

16 before BLC was ever even contemplated.

17   MR. LeCOMTE: I appreciate that. Did you

18 have a comment on point or do I go to Amy?

19   MR. WOOD: Go to Amy.

20   MS. FISHER: I just have two short comments.

21 The first is that PJM has several formulas in Schedule

22 12 which have a series of different pieces that need to

23 be accumulated together, I'm thinking of the multivalued

24 projects, which determines beneficiaries and how

25 different cost allocations are going to be added up and

1   allocated. So there's the public policy piece, that

2   goes to the state; there's the market efficiency piece,

3   that goes in accordance to 1.25 to one formula; and then

4   there's the reliability piece which is allocated based

5   on solution-based DFAX. This is not a one size fits

6   all, there's no reason why you can't count up all the

7   beneficiaries in each of their different ways and cost

8   allocate. Yes, it's a little more complicated, but the

9   alternative is simply to have a formula that doesn't

10   work for ex-ante purposes.

11   And I would just make one more comment,

12   which is the statement that Steve made that

13   solutions-based DFAX under Schedule 12 measures use is

14   just not a true statement. It measures use and then it

15   has special savings rules which change the allocation so

16   that it no longer measures use.

17   MR. LeCOMTE: Thanks.

18   Frank or Takis. Mic, please.

19   MR. LAIOS: Takis Laios, PJM Transmission

20   Owners. Two comments: The first one, going back to the

21   short circuit discussion about if we're going to focus

22   on the parties that incrementally pushed the short

23   circuit over the top then -- we talked before lunch

24   about what you do about the parties that chewed away at

25   that capability creating the situation for that

Page 100

1   incremental situation to occur. And then as you put the

2   solution in place, there would be others parties in the

3   future if you hadn't put the solution in place that

4   would have contributed to the violation. So if you

5   don't have the metric to measure their use of the

6   solution, you are creating a free ridership situation

7   there. So the solution-based DFAX approach addresses

8   all that.

9   Again, any causation-type approach would be

10   a one-time calculation, you have to decide what you do

11   to the parties that came before the incremental

12   violation was created, and then the parties that come

13   later that benefit from the fact that the project is

14   there would have contributed to that short circuit

15   problem that are not paying for that project, so you're

16   creating a free ridership.

17   Regarding the economic issue is, first of

18   all, the projects that we're talking about here are

19   reliability projects. So the question is: Why would

20   you use an economic metric for reliability projects? If

21   you do it for these so-called special set of projects or

22   unique projects, wouldn't you be compelled, then, to do

23   it for all of the reliability projects? So essentially

24   all of the reliability projects would need to go through

25   an economic calculation.

1   And the final thing with the economic

2   approach is it's still a one-time calculation, it's not

3   updatable each year. It's similar to the

4   violation-based DFAX approach, you do that calculation

5   as a one time and you cannot revisit it. So

6   consequently it's not -- in that respect it's not any

7   better than the issues we come to with violation-based

8   DFAX, it's not updatable. So I appreciate that.

9   MR. LeCOMTE: Thanks.

10   Bob, did you have a comment? Sorry to whip

11   the mic around the room.

12   MR. WEISHAAR: Yes, thank you.

13   A few comments. One, on the total benefits

14   associated with the project, when PJM ran its market

15   efficiency study for Artificial Island it showed that

16   the total LMP, just LMP -- related benefits of the

17   project, were around the order of $169 million, and that

18   was just a one-year snapshot. So when you're looking at

19   sort of return on investment and cost benefit ratios

20   over time, and looking at an estimated cost of $275

21   million on the Artificial Island project, and if you

22   take an economics-based allocation, the zones can look

23   at this on a return-on-investment-type basis where they

24   get the benefits associated with the cost responsibility

25   for that particular project.

Page 102

1   When we looked at -- we have two issues

2   today: One is the definable category, and I think it's

3   getting pretty clear and clearer that Artificial Island

4   falls into a definable category. It is a

5   stability-based project, there is one of 1,200. The

6   second issue is a little more challenging, and we

7   thought about what is the appropriate approach for cost

8   allocation? It is a reliability-driven project, but

9   coming up with an objective, quantifiable, independent,

10 neutral approach for quantifying the reliability

11 benefits is extremely difficult. So we got to sort of

12 the next step of what are the other options? We looked

13 at the Con Edison approach of a load ratio share. That

14 load ratio share in the context of Artificial Island

15 would likely result in a hundred percent of the costs of

16 Artificial Island being allocated to the PSEG zone,

17 which raises equity issues in the reverse. Because when

18 you look at the LMP benefits, only 16 percent of the

19 LMP-related benefits inure to the benefits of the PSEG

20 zone. So you would have almost the reverse of what the

21 Delmarva zone is facing today. So that raises its own

22 set of equity issues.

23   Another option would be to allocate some

24 cost to the generators that are directly benefitting

25 from the line. The line will allow generators to

1   produce more energy; you can measure that, an

2   incremental amount of energy, the same generators went

3   through interconnection studies over the past 10 years

4   and didn't receive any allocation of additional upgrade

5   costs or interconnection costs associated with those,

6   even those issues that were present during that time

7   period. So another option is to allocate some or all of

8   the costs to the generators in that area that will

9   benefit from increased output. That is not a direction

10 that the Commission has taken to date; nothing precludes

11 the Commission from taking that, but it's not an

12 approach that the Commission has taken to date.

13   So we came to option 3, which looks at that

14 LMP-related benefits, and to the extent that PJM can

15 quantify them, any capacity-related benefits, and are

16 proposing to allocate the costs of the Artificial Island

17 project based on those economic benefits. These are

18 studies that -- the methodologies for which are

19 specified in Schedule 12, and also in Schedule 6 of the

20 operating agreement where PJM already has formulas in

21 the tariff for determining the capacity and the

22 energy-related benefits of a particular project. So

23 it's administrable; it's capable of being done by PJM;

24 it's capable of being updated on an annual basis just

25 like SBD facts. So you can get to an outcome here where

Page 104

1 our touchstone, our ultimate objective, is benefits have

2 to be roughly commensurate with costs.

3   MR. LeCOMTE: If I could -- and I will get

4 back, Frank and Esam.

5   But following up, Bob, so you would advocate

6 something like that for in the case of the stability

7 related to the Artificial Island. Tell me what you

8 think of that approach for some of the other type of

9 violations, storm hardening or short circuit. Is there

10 an appropriateness in those types of violations?

11   MR. WEISHAAR: We have not taken, obviously,

12 a thorough look into the short circuit issues because

13 what we're facing in the Delmarva zone is a

14 stability-based project. So we have not taken a

15 position, I think that's for the other parties to

16 discuss and address.

17   MR. LeCOMTE: Sure.

18   On the way back to Frank and Esam, if I

19 could stop at Steve and ask him to respond to that,

20 since the mic is going by you, Steve.

21   MR. HERLING: I think we're going to need to

22 clarify some of the market efficiency analysis that is

23 being discussed. A traditional market efficiency

24 analysis, when we look at a new transmission project,

25 would be to model the system with the line in place and

1   without the line in place; and we did perform that

2   analysis some time ago. I don't remember the numbers,

3   but I'm fairly certain the numbers that Bob is referring

4   to was related to a market efficiency analysis that

5   Delaware specifically asked us to perform, which was to

6   compare the system as it is today but with one nuke

7   turned off to the system in the future with the new line

8   and all three nukes running. The premise being that

9   without the solution the probability of one nuke needing

10   to be turned off would be increased potentially over

11   time. So the large deltas that were observed were as

12   much or more a function of one of the nukes being off as

13   they were of adding the line to solve the stability

14   problem. So that is not a traditional PJM market

15   efficiency with a capital M, capital E, analysis. It is

16   a means of identifying certainly the LMP impacts of the

17   stability of the unit.

18   MR. LeCOMTE: For what was specified?

19   MR. HERLING: For what they asked for. So

20   clearly the stability impact of the nukes is reflected

21   at least in some fashion by the LMP impacts of turning

22   one of those units off. I won't argue with that, okay.

23   But that's not a traditional market efficiency analysis

24   as we would perform it under the operating agreement,

25   okay.

Page 106

1   Now, to your other question, if we were to

2   start running market efficiency analysis to look for the

3   ancillary benefits of every reliability solution, first

4   of all, that would be a tremendous amount of work. I'm

5   not sure to what extent it would show us a different set

6   of beneficiaries than the parties who are flowing in the

7   direction of the new line anyway. Today we do, with the

8   new cost allocations, we do an analysis to show how many

9   hours the flow is in one direction versus the other;

10   that's part of the solution-based DFAX analysis, it's

11   essentially a weighting mechanism. If the flow is

12   50/50, 50 percent north, 50 percent south, then we

13   attribute benefits at both ends of the line equally. If

14   it's 90/10, obviously the primary direction of flow is

15   where most of the benefits are. So we do that analysis

16   but it's based on the system as it exists moving forward

17   to, I think it was Takis' point earlier, if we were to

18   try to do a traditional market efficiency analysis where

19   we actually wanted to see the benefit of the line

20   itself, that would mean removing each line that we have

21   approved over years and years one at a time and looking

22   at do you unwind the system to the conditions that were

23   in place 10 years ago? That would be an enormous amount

24   of analysis. So I wouldn't suggest that that is doable

25   in any reasonable fashion on a repeated basis. Somebody

1   made the comment that we could do that analysis; I don't

2   think that's possible.

3   MR. LeCOMTE: Thanks.

4   If I could get comments from Frank. I

5   appreciate you holding.

6   MR. RICHARDSON: Thank you and sorry to move

7   back a little bit. You started out with some comments

8   from the merchant transmission owners. The merchants

9   have made quite a bit of the fact that they're

10   different, they need to be treated different, they need

11   special rules, it's a different context for them. And I

12   think it's really important for us to understand that

13   that question has been answered by FERC. And the PJM

14   transmission owners in executing the cost allocation we

15   have to follow the FERC order, it's Opinion 503, maybe,

16   (a) I think. But that opinion basically says that when

17   it comes to the merchants they need to be treated like

18   any other zonal load.

19   And so when it comes to cost allocation, we

20   do not treat them separately because the FERC order says

21   that's how they need to be treated with respect to cost

22   allocation. So we have had prior discussions with some

23   of the merchant transmission when we put these cases

24   into abeyance: We met with them, these are things that

25   the transmission owners considered, how special can they

1   be treated. And the answer is not too special according

2   to that order that came out from FERC. So I think we

3   need to understand that the current cost allocation

4   reflects what that order tells us to do with cost

5   allocation.

6   MR. LeCOMTE: Thanks.

7   Esam?

8   MR. KHADIR: Thank you. I just want to make

9   a couple points regarding the market efficiency analysis

10   that the Delaware Commission had asked PJM to do. The

11   Delaware Commission has regarded the issue, and the

12   scenarios are basically unrealistic scenarios. For

13   someone to assume that one of the selling units can be

14   out for a whole year, that's -- I've been working with

15   PSE&G since 1976, about the time that those units were

16   put in commission. And up until now I have not seen one

17   of those selling nuclear units out for a year because of

18   stability issues, and I don't believe that they will be.

19   Now, I'm also in charge of running the

20   stability analysis and coming up with operating guide

21   for those units. The only time that we even reduce the

22   output of those units is when there is a transmission

23   line out. And we do not take transmission lines out

24   with three units in service; we wait until one of the

25   unit is doing refuelling outage and then we take that

1   line out at that time. And when you have two units

2   operating you don't have to reduce anything. So the

3   results from that analysis is totally unrealistic.

4   Now, PJM, as they were doing their

5   comparison, the proposal comparison analysis for

6   Artificial Island, they performed a market efficiency

7   analysis according to the assumptions developed by TEAC,

8   and reviewed those assumptions with TEAC. The results

9   from that market efficiency analysis shows that there is

10   about 90,000 to a million dollar worth of benefits over

11   15 years, and all of that 90,000 to a million dollars, a

12   percentage of that 90,000 to a million dollars, were to

13   the Delmarva zone. Now, that is real assumptions that

14   we use to develop market efficiency, the best case that

15   we use to develop market efficiency results, and that's

16   the results that you should be using.

17   One other thing is you're going to be

18   looking at benefits you need to look at the capacity

19   benefits also to the zone. So that additional line from

20   Salem to Delmarva would provide huge increase in the

21   CETL for the capacity transmission limit for Delmarva

22   that would prevent it from splitting in the future. And

23   knowing how all the generation is there, that is a very

24   potential scenario.

25   MR. LeCOMTE: Thanks, Esam.

Page 110

1   If we could get the mic over to John,

2   please.

3   MR. FARBER: Thank you. John Farber,

4   Delaware Commission staff.

5   If I could just briefly respond to this

6   issue that's coming up today in terms of it's acceptable

7   to impose the solution-based DFAX and suspend the

8   requirement for roughly commensurate with benefits

9   because over time somehow the benefits will inert. And

10   I find it hard to accept that there are characteristics

11   in the Delmarva zone that would somehow shift that 99

12   percent cost responsibility to the Artificial Island

13   facility any appreciable amount over 30 years.

14   And I think it's patently unfair to impose

15   on the Delmarva customers the requirement to pay roughly

16   a 30 percent increase in transmission costs solely on

17   the basis that to pay those costs for an indeterminate

18   amount of time, whatever the transmission owners decide

19   is appropriate --

20   MR. LeCOMTE: John, I understand your

21   position, and I'm trying to follow up on this. If it's

22   going to be argumentative comments, I want to move onto

23   some other questions, so --

24   MR. FARBER: Okay, it would be unfair for

25   the Delmarva zone to accrue this cost over time.

1   MR. LeCOMTE: I understand, I read those

2   positions.

3   Steve, I got another curiosity for you as we

4   talk about the reliability concerns, and especially we

5   talked about the allocation of short circuit and the

6   majority, the vast majority, to the zone. And I think,

7   if I understand correctly, those are somewhat discreetly

8   identified reliability concerns where you can address

9   the concern. To the extent that we have -- and you've

10   identified in the dockets that you have under short

11   circuit a short circuit problem, I suspect that that's a

12   -- short circuits may be the primary driver of the

13   project, but that there are other reliability issues

14   that are being addressed in that project in particular.

15   But I want to talk about it in a generic sense.

16   MR. HERLING: Sure. That project, by its

17   design, obviated the need for a number of smaller

18   projects that had already been identified for other

19   reasons. And then, honestly I'd have to go back and

20   pull out what each of those were. The project itself

21   was designed to solve the short circuit problem. It was

22   essentially a secondary benefit of the project that it

23   would then eliminate the need for certain other

24   projects. So you're correct in that characterization.

25   MR. LeCOMTE: And to the extent that, for

Page 112

1   the majority of short circuit-related, that are

2   allocated -- well, I think you said that they

3   were generally either addressed at the generator

4   interconnection study or that they were under the

5   thresholds and allocated to the zone.

6   MR. HERLING: Correct.

7   MR. LeCOMTE: So in that sense, can you

8   comment on, then, the appropriateness of the DFAX then,

9   for what generally doesn't seem to be allocated under

10 that mechanism?

11   MR. HERLING: Well, we don't attempt to

12 establish any DFAX for those problems. You can't

13 realistically perform -- I suppose you probably could,

14 I'm not sure what it would tell you, for replacing a

15 circuit breaker. But because the allocation is to the

16 zone, we don't actually perform the calculation; there's

17 no reason to. When we have a single circuit breaker

18 that needs to be replaced and the cost is $300,000,

19 because we know the reallocation is to the zone there's

20 no reason to even attempt to perform a DFAX calculation.

21 It's only -- this is, as I said, this is the first time

22 we've had to do it and it's because the solution was

23 aligned. And in particular now we have a DFAX

24 calculation that's based on the use of the solution and

25 is really divorced from the nature of the problem that

1   required the solution.

2   Now, years ago if the same thing had

3   happened there would not be a violation-based DFAX that

4   could be applied to a short circuit problem. So I can

5   only tell you I don't know what we would have done if

6   the same problem had occurred 10 years ago. The rules

7   would not have provided for that situation.

8   MR. LeCOMTE: Thanks.

9   Mayer, did you have a comment, please?

10   MR. SASSON: Just a very brief comment, Ron.

11   And your questions were more on short circuit.

12   I want to go back just briefly to storm

13   hardening questions. And the fact that if you try to

14   apply solution-based DFAX to that -- which has been

15   done -- you get results that are -- somebody already

16   said "strange," but it's more than strange. You fix a

17   substation, you build some lines, those substations have

18   loads, and it turns out that the owner of those

19   substations and serving those loads actually paid not

20   even one dollar, not even one penny for it. So it turns

21   out that you apply the method and it turns out that Con

22   Edison and Linden would pay a hundred percent of that,

23   and yet the owner of the facility, the zone where that

24   facility is, is allocated zero dollars. And that just

25   cannot be. That's why I go back to the idea that it's

Page 114

1   the zone that needs to pay, that's the zone that has the

2   benefit.

3   MR. LeCOMTE: Thanks.

4   Steve, if I could turn back to the matrix

5   that you folks provided. Could you maybe clarify for me

6   the distinction between real-time operation concerns and

7   stability?

8   MR. HERLING: Which category was this?

9   MR. LeCOMTE: Well, there's actually two

10   separate categories in the matrix that you provided.

11   One that provided stability, and there was one project;

12   and then in the matrix there was a real-time operation

13   concerns, they were about 50 projects that you

14   identified in there.

15   MR. HERLING: Yeah. Operational performance

16   is a category that we use when we have repeated

17   operational problems that, when you study them in a

18   planning case, they don't actually manifest themselves

19   as a violation of NERC planning standards. But, for

20   example, we have -- I can never remember what the

21   acronym is. We have an operational procedure that is

22   essentially it's a local load relief procedure where we

23   have to be prepared to shed load for various operational

24   circumstances. If that happens once we deal with it, if

25   it happens dozens of times in a period; that's obviously

1   an indicator that we should do something to resolve the

2   problem through planning even though there may not be a

3   violation of planning standards. So we use the

4   operational performance category to review operational

5   circumstances between planning staff and operating

6   staff; identify things that are repetitive in nature; we

7   bring them to our transmission expansion advisory

8   committee; we review them. We then pursue a solution.

9   MR. LeCOMTE: As I understand, the

10   allocation methodology that you've identified in the

11   matrix would be the solution-based DFAX?

12   MR. HERLING: Correct.

13   MR. LeCOMTE: So for those types of

14   operational concerns the beneficiaries are appropriately

15   identified through the solution-based DFAX?

16   MR. HERLING: I'd have to go back and look

17   at all of them. But I believe most, if not all, have

18   either manifested themselves as flow-based where we had

19   to build a line to solve the problem, or voltage-based

20   where similar to a voltage criteria violation, even if

21   the solution was to add a reactive device, we could

22   create the same type of surrogate through a line or an

23   interface where the flow is a good indicator of the

24   nature of the problem and therefore a good basis for

25   cost allocation. So most operational performance issues

1 look like either thermal overloads or voltage problems,

2 and therefore the cost allocation, it kind of makes

3 sense to do it the same way.

4 MR. LeCOMTE: Why wouldn't stability fit

5 into that operational concern?

6 MR. HERLING: Well, it could. The nature of

7 a stability problem is that for a particular fault that

8 you apply on a system, the power plants, the generators,

9 will swing and trip off the system because they lose

10 synchronism. In the case of Artificial Island it was a

11 combination of issues where if all of the units were

12 running and we saw operational situations where we had

13 high voltages, we would have to change the reactive

14 output of the units which would move them into a

15 condition where they became unstable. So it was you

16 were fighting one operational solution against another.

17 And ultimately we pursued a solution of a transmission

18 line to improve the stability. The original nature of

19 the problem is the rotational inertia of the generators;

20 they were unstable for certain faults. So it's not like

21 an operational performance issue which is related to

22 flow two-load in an isolated pocket that looks just like

23 a thermal overload and you can treat it for a solution;

24 and for cost allocation pretty much the same way.

25 Stability, it's just analytically unique

1   compared to voltage or thermal overload problems. You

2   may end up solving the problem with a line, but when you

3   then do -- if you're trying to attribute benefits, the

4   use of the line is certainly a way to measure some of

5   the benefits of solving that problem. The discussion we

6   had earlier, though, got to the issue of initially just

7   solving the stability problem there are probably some

8   benefits that are not being captured by the use of that

9   one single line that you have now built. That's really

10   the discontinuity, is how do you weigh the benefits of

11   solving the stability problem with the benefits of

12   having a new line? And some of the things that have

13   been said are certainly correct, that that line creates,

14   in the case of Artificial Island that line creates

15   another feed to the Delmarva peninsula. If there were

16   to be price separation in RPM that line would provide a

17   significant benefit. But there are also benefits

18   associated with resolving the stability problem, and

19   those are not being captured, at least in total --

20   they're captured in part -- by the use of that one

21   facility.

22   MR. LeCOMTE: To the extent that you -- and

23   correct me if I mischaracterize -- the operational way

24   that may be flow to the load as opposed to instability,

25   then is that flow from the generator? Is that --

Page 118

1   MR. HERLING: Well, stability problems, I

2   described them in the table as being somewhat radial in

3   nature because you have a cluster of generators the

4   energy has to get out to the load. And you can look at

5   stability as if you drew a circle around the plant it's

6   the strength of all of the outlets to the rest of the

7   system that determined the stability of the plant, among

8   other things. But the strength of the transmission

9   system determines the stability of the plant. So it is

10   kind of a 360-degree outward phenomenon.

11   MR. LeCOMTE: And did I hear you make

12   comments previously related -- because I'm -- to the

13   extent that I understand your comments now on stability

14   and the outward nature, is this something that's

15   generally addressed, though, at the generator

16   interconnection analysis or studies?

17   MR. HERLING: Well, just to be clear: It is

18   addressed for each new generator in the interconnection

19   process. There is also a NERC transmission standard

20   that requires us to test the entire system, which we do

21   every year. So we test the stability of the entire

22   system in the RTEP every year. We've never had a

23   problem other than the two very small problems I

24   described earlier that were resolved by controlled

25   devices within the plant and now Artificial Island. All

1   of the other problems were always identified on a new

2   generator as it was being requested to connect to the

3   system.

4   MR. LeCOMTE: So you studied the problem on

5   a regular basis. And so we've identified a problem in

6   one particular circumstance here. Tell me how would you

7   address future problems or if you were to find the next

8   problem?

9   MR. HERLING: Well, for the time being, we

10   would address it in the same fashion. We would look for

11   the most affective transmission solution, assuming that

12   there were no easy control device solutions. Including

13   a stabilizer on a plant is a fairly cheap solution, and

14   we've done that before to resolve at least one problem

15   in the past. So assuming there is no cheap control

16   device solution, we would look for a transmission

17   solution, we would look for the most cost-effective

18   solution, we would ask the Board to approve it, and we

19   would apply the cost allocation as it exists today,

20   which iis based on solution-based DFAX.

21   MR. LeCOMTE: Okay.

22   MR. ROLASHEVICH: Thanks, Ron.

23   So here's a question for PJM: Steve, in

24   terms of your matrix, does this exhaust all possible

25   categories in terms of --

Page 120

1   MR. HERLING: Including the ones that I

2   don't know yet exist?

3   MR. ROLASHEVICH: Yes.

4   MR. HERLING: I believe it does. It's

5   certainly possible that something can come up in the

6   future, but I think it exhausts -- I think it covers

7   everything that is currently in our purview to implement

8   through the RTEP.

9   MR. ROLASHEVICH: Again, I'm not asking you

10 to predict the future, but do you think that any of

11 these categories are subject to an increasing number of

12 projects? Do you think that some of these projects are

13 going to increase the number of projects listed in the

14 PJM RTEP?

15   MR. HERLING: I think was the grid is aging

16 you will see more aging infrastructure projects. I

17 don't know whether we're going to see more

18 storm-hardening projects; obviously, Hurricane Sandy was

19 a pretty big deal. I don't know how much is left out

20 there that we might find needs to be improved in that

21 fashion.

22   Stability? I honestly don't think we're

23 going to see very many of those as we move forward. I

24 think this was a unique situation; I don't expect it to

25 occur very often. We could have one more next year and

1   then not again for 20 years; so it's really hard to say.

2   Reactive problems, thermal problems, that's

3   going to be 99 percent of the RTEP for a long time.

4   MR. ROLASHEVICH: I have one more question

5   for the Maryland and Delaware State Commissions. So in

6   terms of saying that an economic analysis, using

7   something like an LMP analysis, would be something that

8   we should look at, are you saying that's in place of

9   solution-based DFAX, and at the time or are you saying

10   there's some sort of hybrid that should be looked at?

11   MR. WEISHAAR: We would suggest that you

12   look at that in lieu of solution-based DFAXes unless

13   there was some affirmative demonstration that this was a

14   flow-based or thermal-based problem, and that hasn't

15   been shown yet. So we have a disconnect between the

16   driver or the outcome this project and the use of

17   solution-based DFAX.

18   MR. ROLASHEVICH: Thank you.

19   MS. TEETER: Hi, this is Valerie Teeter with

20   FERC staff.

21   I just had a quick question. I'll start by

22   addressing it to you, Steve, but anyone else can chime

23   in if they're interested. So this is going back to your

24   discussion a little bit earlier about the benefits of

25   projects to address short circuit issues, particularly

Page 122

1   transmission lines necessary. But just kind of more

2   generally with respect to projects to address short

3   circuit issues and then stability issues, what are

4   really the benefits of these projects in the most

5   general sense possible? And who are the beneficiaries?

6   Is it a matter of the beneficiaries are just those whose

7   direct problem is resolved? Whose problem is it really?

8   Is it a given transmission owners? Is it an entire

9   system problem? Can the problem change over time? I

10   just want to get a better feel for how the system

11   dynamics, and the fact that the system is constantly

12   changing, impacts the benefits and beneficiaries of

13   these projects.

14   MR. HERLING: I think you're talking about

15   short circuit in particular?

16   MS. TEETER: Short circuit, and projects

17   meant to address stability issues would be helpful as

18   well. Thank you.

19   MR. HERLING: Okay. Well, the stability,

20   clearly as long as the generation in a particular area

21   continues to exist, that stability will continue to be a

22   problem. If there were local load that could grow

23   significantly, that would potentially -- you wouldn't

24   need to deliver the energy further away on the

25   transmission system. But it's really a function of how

1   much generation you have in a local area and how strong

2   the transmission system is to take that power away,

3   okay. So, yeah, over time if a generator should be

4   retired that could reduce the stability problems in a

5   given area. But that's a fairly-easy-to-predict kind of

6   a situation, it's not something that kind of creeps up

7   on you.

8   Short circuit is harder in that respect

9   because every generator added everywhere will contribute

10   to the problem, maybe in very, very small amounts.

11   Every transmission line that you build will bump up the

12   short circuit duty, again, maybe by very, very small

13   amounts, but it's something that we study every year.

14   But as a breaker approaches its capability, we view it

15   as not being a problem. When it reaches its capability

16   then it's a problem. So if you want to look back over

17   time we can see situation trending, but until you

18   anticipate the need for the next big transmission line

19   or the next generator building close by, you don't know

20   when you might trigger that violation.

21   The nature of a short circuit problem is

22   such that if a breaker is over-dutied and it's called

23   upon to interrupt the fault, it may very well explode.

24   Which, aside from the safety issues, will be disruptive

25   to the ability of the grid to function in that area

Page 124

1   until such time as you can repair whatever damage has

2   occurred. So it could have a noticeable impact on an

3   area of the grid, and then depending upon how severe the

4   damage it could be a fairly significant problem.

5   MR. LeCOMTE: Thanks.

6   MR. RICHARDSON: Frank Richardson with the

7   transmission owners.

8   I'd like to answer your question a little

9   bit differently. Right now that stability problem that

10 is solved at Artificial Island, there is a cost

11 allocation for it. And I think we must remember that

12 every zone in PJM is paying something for that project,

13 every zone in PJM is benefitting from it. From solving

14 the stability problem on Artificial Island, it affects

15 the entire PJM grid. And everyone is getting a cost

16 allocation. There is one zone who's getting a brand-new

17 230 kV line into their zone with 3,800 megawatts

18 attached to it and they're getting a substantial amount

19 of the cost for that project. On the surface and face

20 value, that would make sense.

21   MR. LeCOMTE: Thanks.

22   Pass the mic down. Amy, please.

23   MS. FISHER: I appreciate that question. I

24 think that's the obvious legal question that we all have

25 to sit here and answer. Because what we're here to try

1   to figure out is how these costs measure against

2   benefits. And I just want to clarify in response to

3   Chip's earlier comment, we are not relitigating Opinion

4   503. Opinion 503 said that merchant transmission

5   facilities had to share in cost allocations for

6   transmission upgrades. It did not say that we should

7   not be measuring benefits relative to costs. So I just

8   wanted to make it clear that we are not challenging

9   Opinion 503, and I think that's important for everyone

10   to understand.

11   However, what I would say is that there are

12   benefits and there are incidental benefits. If the

13   purpose of the upgrade is not to improve the way you use

14   the system but you nonetheless benefit in some amorphous

15   way, then that's why we have load share and the 50

16   percent of the project costs that are borne by load

17   share. And I believe that's what Chip was just

18   referring to. That doesn't mean that every person who

19   incidentally moves power over the line should be cost

20   allocated the same way that people for whom the blow-up

21   of the transformer or the breaker is really what's being

22   sought for.

23   MR. LeCOMTE: Thanks.

24   Mayer?

25   MR. SASSON: Thank you. A couple of ideas.

Page 126

1 I assume that when you said that everyone's paying for

2 it and somebody's getting the line he's probably

3 referring to the 50 percent socialization. Is that the

4 case? When you said that every zone is paying, you mean

5 because of the socialization?

6   MR. RICHARDSON: I don't have it in front of

7 me. But every zone's got an allocation, yes.

8   MR. LeCOMTE: Mayer, I'll give him a chance

9 to answer. If you want to make your comment, and then

10 if he has something to respond to, thanks.

11   MR. SASSON: I will assume that that's what

12 he meant, that through the 50 percent socialization.

13 And that is, depending on the voltage level, if the

14 voltage level is lower it's a hundred percent DFAX so

15 nobody else would be paying.

16   But what I wanted to answer your question

17 very directly is: It's clear that the issue is short

18 circuit, the issue of stability, the issue of storm

19 hardening, we know what the issue is. And therefore

20 solving that issue, depending on the purpose of the

21 facility that you're putting in, you know what the

22 purpose is, is to solve that issue. And the zones,

23 where they are, that's who pays and that's what we've

24 said, the zone pays. However, are there any flows on

25 those lines? And I think that's what the confusion may

1   be. Yes, there are some users for those lines but those

2   users have incidental benefits because they're using it.

3   But the line was not put for their benefit. But given

4   any line there will be users, and those users have

5   incidental benefits and they're not the primary

6   benefits, which are those that had the benefit because

7   of the purpose of the project of addressing the issue

8   that brought the line. So you have -- you need to make

9   sure we understand we have those two types.

10   MR. LeCOMTE: Thanks, Mayer.

11   If you could pass the mic down to Takis,

12   please.

13   MR. LAIOS: Thank you. Takis Laios, PJM

14   transmission owners.

15   Two observations: Obviously we're here

16   trying to figure out why these cost allocations look as

17   maybe blatant to some folks as compared to other cost

18   allocations. But I want to throw two additional

19   observations that we may want to take into

20   consideration. As far as the merchant entities that

21   were cost allocated, the projects in question here is

22   that the cost allocation would be dramatically different

23   to recognize that they're a single-load zone. If they

24   were not a single-load zone, if that load was part of

25   the host zone of the larger zone or the one that they're

Page 128

1   interconnected with, the cost allocations would be

2   dramatically different. So the phenomenon that is a

3   single load zone is a consideration.

4   Regarding the Delmarva cost allocations, we

5   know that's where the physics are putting the flows and

6   solution-based DFAX measures those. So for this

7   particular project it's not surprising by looking at the

8   map as to where the project is going; it's not

9   surprising whose megawatts are flowing on that. But at

10 the same token, there are lots of other RTEP projects

11 throughout the rest of the PJM system that

12 solution-based DFAX sees to it that the Delmarva

13 Peninsula does not get cost allocated for those projects

14 because, again, from a locational point of view the

15 Delmarva load is far, electrically, away from those

16 facilities. So basically, because you have one project

17 here that may look maybe disproportionate in some eyes,

18 you also have to take into consideration all the other

19 RTEP projects where the Delmarva loads are not picking

20 up any cost allocation.

21   So on the whole, when you look at the entire

22 set of the RTEP reliability projects, the cost

23 allocational construct essentially is a portfolio or, if

24 you will, a range of RTEP projects, essentially treats

25 everyone the same. So it's not a situation where the

1   construct is necessarily picking on this particular load

2   to these particular entities. If you step back and look

3   at the whole set of RTEP projects and how solution-based

4   DFAX treats them is equitable, again, on the large

5   picture basis.

6   MR. LeCOMTE: Thanks.

7   One more question from Staff and then we'll

8   take a break.

9   MR. GROSS: Ed Gross from Staff.

10   Question directed to Mr. Herling. It's kind

11   of a thought experiment, actually, what I want to

12   suggest, and an uncomfortable one at that. Assuming

13   arguendo that a short circuit problem exists on the

14   system which for some reason PJM missed, and a bad thing

15   happened and we go well beyond what happens as far as

16   for flows for the breakers themselves and we pass our 80

17   KA position, could you describe some of the effects that

18   might have? Well, let me just ask you straight-up would

19   probably be easiest. Short circuit problems that would

20   happen would affect the system in general, the breaker,

21   the connected facilities around that system, whereas

22   possibly sounds like stability problems affect the

23   generators and have more implications for the operations

24   of the generators, would that be an accurate statement

25   in your mind?

Page 130

1   MR. HERLING: There's a bit of interaction

2   there. If you have a stability problem, the generator

3   that becomes unstable can swing and can cause other

4   lines to trip. It can cause other generators to trip.

5   It could spread into a more substantial problem or it

6   could be very local and the generator trips and the

7   system is just fine. So it really depends on the nature

8   of the problem that initiates the stability event.

9   We've had some pretty significant system

10   events that started out as stability problems. With

11   short circuit, if you had a fault that exceeded the

12   capability of a circuit breaker, whether it's 80 KA or

13   any size, it could be restricted literally to that

14   substation. The breaker blows up a couple of lines open

15   and that's the extent of the problem, or it could then

16   cascade where you have lines overloading and more lines

17   tripping, you could have local stability -- it could

18   cause local stability problems on generators. And,

19   again, depending upon circumstances if things go badly,

20   it could cascade into a much more severe event. More

21   than likely in both cases it's going to be very

22   localized, but sometimes bad things happen. So it's

23   possible that it could extend beyond the local area.

24   MR. GROSS: Just looking at the first-order

25   effect, if you would, as far as either a short circuit

1   event or a stability event, could you say that the short

2   circuit affects more the system or stability affects

3   more generators, or you would say that it's really

4   depends upon the event?

5   MR. HERLING: Short circuit will have an

6   immediate, physical impact on transmission

7   infrastructure. Stability will have an immediate,

8   physical impact on generating infrastructure. But the

9   likelihood of that propagating out and affecting

10   customers, meaning load, depends entirely on the

11   circumstances.

12   MR. GROSS: Thank you for your answer.

13   MR. LeCOMTE: Okay, again, right on

14   schedule. It's 2:45. Let's take a 10-minute break.

15   We'll come back at 2:55 and have any follow-up. Thanks

16   so much.

17   (Whereupon a short recess is taken.)

18   MR. LeCOMTE: Okay, we had a few follow-up

19   questions. Steve, I just wanted to see if you wanted to

20   follow up on some of the earlier conversation.

21   MR. HERLING: I'm sorry, if I wanted to

22   follow up?

23   MR. LeCOMTE: If you had a follow-up

24   response, I think you indicated you had some on some of

25   the earlier questions related to the types of

Page 132

1   violations.

2   MR. HERLING: Yeah, you had asked me in

3   particular about the one short circuit problem, and I

4   had mentioned that there were a number of other projects

5   that are already been identified which were then not

6   required. That material is in one of our TEAC

7   presentations, and that was a big part of why we chose

8   that solution, was because while it costs a lot of

9   money, it obviated a number of projects on a net basis,

10 made the project look much more effective. But I'm

11 looking at about nine projects that were identified for

12 other reasons. I don't have all the particular

13 violations. But they would have been built to resolve

14 other problems and now they're not necessary.

15   MR. LeCOMTE: Okay, thanks.

16   MR. HERLING: We can get you the details and

17 provide them at some later date if you wish.

18   MR. LeCOMTE: Just as a general thought,

19 though, that those violations would not necessarily have

20 been short circuit violations?

21   MR. HERLING: They were not.

22   MR. LeCOMTE: Right, thanks. And violations

23 that would have been allocated under the solution-based

24 DFAX?

25   MR. HERLING: Yeah. My guess, without

1   knowing for sure, is that that were all related to one

2   thermal criteria violation or another, possibly a

3   reactive violation, but they all would have been

4   appropriately allocated using the solution-based DFAX.

5   MR. LeCOMTE: Thanks.

6   Mayer, did you have a --

7   MR. SASSON: Just briefly, Ron. Just to

8   make sure it's clear: The entire BLC project is needed

9   for short circuit. And I think that's an important

10   aspect. And I think Steve said earlier it's sort of an

11   add-on that it can also solve the others, but -- which

12   is different. If you needed the project to solve one,

13   another project to solve another, you choose one that's

14   more efficient that solved both. That's not the case

15   here, actually, entire one hundred percent of the

16   project is needed for short circuit. Now, it has other

17   things, but --

18   MR. LeCOMTE: Thanks.

19   Val?

20   MS. TEETER: This is Valerie Teeter again

21   with FERC staff.

22   Just one quick question for PJM for Steve.

23   This is specifically about the chart that you provided

24   in the appendix to your pre-technical conference

25   comments. You indicated under the "end of life/aging

Page 134

1   infrastructure criteria" that there is, in terms of

2   stakeholder-identified issues, a question as to whether

3   the flows over the original facility, that capability

4   should be treated the same way for purposes of cost

5   allocation as the incremental capability made available.

6   Could you just elaborate on that point so we have a

7   better understanding?

8   MR. HERLING: We were trying in that column

9   to represent issues that various other parties have

10   raised in a reasonably fair basis. That was a cost

11   allocation question that had come up at one time; it was

12   never really dealt with. But the obvious question is:

13   If you simply replace something in kind -- which happens

14   all the time, transmission owners maintain their own

15   facilities and often have to replace circuit breakers or

16   transformers of even parts of transmission lines -- if

17   they replace them in kind, you may view that one way; if

18   they replace it with something bigger and better, and

19   provides all kinds of additional capability, you may

20   view it differently. And the question arose some time

21   ago: Should you kind of bifurcate and treat the

22   original capability one way and the incremental

23   capability a different way? But that's never actually

24   been dealt with beyond that having been raised.

25   MS. MARTIN: This is Valerie Martin for

1   FERC.

2   I've heard comments here regarding benefits

3   of flow traveling when you build a transmission, the new

4   transmission facility, the benefit from traveling on the

5   line. And I'm trying to understand what benefits do you

6   derive from flow besides the line being built and over

7   time, megawatts traveling on over it, what are the other

8   benefits that you're defining over the years? Because

9   you're talking about initially there are some

10   beneficiaries that are easily identifiable, then you

11   were talking about another project, that within 30

12   years, it may be different.

13   MR. HERLING: Sure. I was describing two

14   categories of benefit. One was just the pure use of the

15   facility. All load needs to be served by energy; the

16   energy has to get from generators to the load. So the

17   transmission facilities that allow for that transfer of

18   energy provide a benefit to that load. So if you build

19   a new line and two zones make use of it to serve their

20   customers, then they are clearly benefiting by its

21   existence.

22   What I was suggesting was that the initial

23   -- this goes back to when we used violation-based DFAX,

24   we then described the beneficiaries as the parties who

25   caused the problem because the elimination of the

Page 136

1   problem returned the system to a reliable state. And

2   those customers who previously had placed the system at

3   risk are now benefiting by the system no longer being at

4   risk. So the causers were the beneficiaries by the

5   elimination of the problem. Now we use solution-based

6   DFAX. Part of the rationale for solution-based DFAX was

7   that for the vast majority of projects the users of the

8   new facility are very similar to the causers of the

9   initial problem. And if you think about flow from A to

10   B, if you have -- people causing flow from A to B, if

11   there's a violation, when you build a new line it's

12   typically going to be in parallel with A to B and the

13   people who caused the problem from A to B will now use

14   the new facility, so the causers and the users after the

15   fact are largely the same. So for 99 percent of the

16   projects -- whatever the percentage is, I'm just

17   throwing out a number -- we believe, PJM believes, that

18   you're capturing both the causers and the users

19   generally through solution-based DFAX. Where that

20   doesn't quite work is when you have a short circuit

21   problem or a stability problem -- because the users in

22   the case of the solution to Artificial Island, you're

23   solving the problem by building one more line, in this

24   case from Artificial Island down on to the Delmarva

25   Peninsula. You could have also built a line to

1   Philadelphia or you could have built a line to Allentown

2   or you could have built a line to Newark, New Jersey,

3   and you would have solved the stability problem, and the

4   users of that new line would have been noticeably

5   different, okay. None of that use is the entire picture

6   of who caused the problem.

7   Now, in fact, load isn't really causing the

8   stability problem; it's a function of the relationship

9   between the generators and the strength of the

10   transmission system. But as somebody, I think it was

11   Mayer, pointed out, the reason you have the generators

12   is to serve load, okay. So if you didn't have load, you

13   wouldn't need the generators. So the fact that the

14   generators are unstable means that we need to fix it so

15   that we can use them to serve load.

16   MS. MARTIN: And over time that's how you're

17   measuring the benefit?

18   MR. HERLING: Over time the use of the line

19   tells you a lot about the benefits of that single

20   solution. My point earlier was 30 years from now when

21   one of the Salem units have retired, there will no

22   longer be a stability problem, but the line will still

23   be there and the line will still be serving a purpose

24   and it will still be providing benefits. So the initial

25   who-caused-the-problem beneficiaries will evolve over

Page 138

1   time.

2   My argument is with thermal overloads and

3   reactive problems, it's largely the same so it doesn't

4   matter. But with stability and short circuit, the

5   original problem is not all that important after some

6   period of time. I don't know whether that's one year,

7   five years, 10 years. Over some period of time who

8   caused the problem is no longer important. And that's

9   why solution-based DFAX is a good indicator over a long

10   period of time of who the beneficiaries are. So really

11   the only question for me, for a really, really small

12   slice of the RTEP pie, is who is the initial beneficiary

13   related to the cause of the problem in addition to who's

14   using the solution. To me that's only the really issue,

15   is --

16   MS. MARTIN: So it's a cause and addition

17   to?

18   MR. HERLING: That's one additional

19   beneficiary. It's not the only beneficiary. But it's

20   an additional beneficiary. You got to decide whether

21   that's a big enough issue to solve. We're talking about

22   a couple of projects here. I realize it's a lot of

23   money, but if we never have another stability problem

24   ever again, okay, we can create a different solution, a

25   different cost allocation solution, okay. I would like

1   to keep it reasonably simple, but we could come up with

2   a different approach that blends in other types of

3   beneficiaries. But honestly I wouldn't expect it to be

4   used very often.

5   MS. MARTIN: Because you could come up with

6   it yourself?

7   MR. HERLING: Oh, sure.

8   MS. MARTIN: Another question is in regards

9   to once a project is selected to resolve the identified

10   problems. And I've heard today that there's multiple --

11   there's a primary driver and there's other elements

12   underneath that?

13   MR. HERLING: Yes.

14   MS. MARTIN: So for each of those, what's

15   the -- are there solutions for each one of those? Like

16   a cost allocation solution for each on of those? How is

17   that --

18   MR. HERLING: Actually, because we're using

19   solution-based DFAX, this is one of the huge benefits of

20   solution-based DFAX. Somebody's mentioned the

21   Susquehanna-Roseland project which had dozens -- it

22   might have been four dozen problems, that were resolved

23   by Roseland. That's a 500-kV line and it was

24   socialized. But to do cost allocation based on 48 or so

25   individual violations and then weight them all and put

Page 140

1   them all back together again would have been a

2   nightmare. With solution-based DFAX you don't need to

3   do that, you have one solution that solves 50 problems,

4   you have one cost allocation based on who uses the

5   solution, not who caused each one of the 50 different

6   problems. That's a huge advantage. That was one of the

7   big reasons, that and the ability to redo the

8   allocations every year based on changing system

9   conditions. Those were the big advantages of moving to

10   solution-based DFAX.

11   MR. SASSON: Can I comment on Valerie's

12   question?

13   MR. LeCOMTE: Okay, since the mic's there.

14   You're in jeopardy when it passes in front of you,

15   Steve, but --

16   MR. SASSON: Valerie, you asked a number of

17   important questions here. You asked a number of

18   important questions here, and I want to make sure that

19   it's clear that in my answer that we're not advocating

20   for violation-based DFAX. That has to be absolutely

21   clear, we said that from the very, very beginning. And

22   I think Steve is saying for thermal overloads the

23   solution-based DFAX is something that can be reproduced

24   year by year over time. It makes sense because the

25   users of the solution are the same as the causers, and

1   there's consistency as we discussed. But we're here to

2   answer the first question that the Commission asked: Is

3   there a category of projects that are based on non-flow,

4   not flow-based but non-flow? And I think we've answered

5   that there are, there is a category of projects that

6   have various -- depending on the nature of the problem,

7   it could be storm hardening, it could be short circuit,

8   it could be stability. So there a number of them. The

9   question, then, is: Once you solve it with

10   transmission, because there has been a violation, storm

11   hardening, something got broken, there's a violation,

12   now you solve it. The question being asked here to some

13   extent is: Do you just cost-allocate a little piece to

14   whoever is the one that had the problem? And then later

15   on you charge other people. And I'm not sure that's

16   fair because the issue was the storm hardening.

17   Now, the fact that they're users later on,

18   that's a different issue. But those issues are all

19   incidental uses and you correctly said there are two

20   kinds, primary and the others. I think it's the primary

21   you would need to address, and that's what I think we've

22   given you, an exact way of doing it.

23   MR. LeCOMTE: Thank you.

24   Takis?

25   MR. LAIOS: Takis Laios, PJM transmission

1   owners.

2   One cautionary observation about the carving

3   out of these special projects. That would necessitate

4   drawing the line somewhere. Once you do that, you're

5   inviting essentially another driver over project that

6   falls outside the carveout that someone doesn't like the

7   cost allocation that results from that project to argue

8   that this should be included in that carveout. So the

9   question right now is once you start a carveout, where

10 do you stop? And that is a concern. And even within

11 the carveout that we've been debating or discussing here

12 today, I think Steve noted that there are differences

13 between stability and short circuit, so even within the

14 two classes of drivers that we're talking about here,

15 they're different from each other. So what stops a

16 third, different driver from being argued that should be

17 included in the carveout?

18   Today we don't have any carveouts.

19 Essentially you're looking at the solution based-DFAX

20 which measures where the physics are placing the flows.

21 So that would be, again, just a cautionary observation

22 as to if we embrace these two as being unique, that

23 that's going to open the door to an argument that a

24 third driver is also unique and should be included with

25 these other two. So I appreciate that.

1   MR. LeCOMTE: Thanks, Takis.

2   I'm actually going to get to you, Amy. But

3   as the mic passes by, Steve, I want to follow up. You

4   sat in the middle.

5   So I know I heard you make some comment

6   about especially to the extent there was a carveout or

7   some small class of reliability projects and that you

8   maybe could identify a beneficiary's mechanism. Maybe

9   you could elaborate on that. Where do you think you

10   would go with identifying those beneficiaries?

11   MR. HERLING: That's a trickier one.

12   Stability, at least analytically, you can visualize the

13   impact of a stability problem geographically. I can

14   imagine a test, I'd have to talk to my engineers, but I

15   can imagine a test that would show me where the impact

16   dwindles to some de minimis level. Short circuit, I'm a

17   little bit stumped. I'd have to think about what that

18   might look like, but I'm not clear. I suppose you could

19   look at the impact of generators, for example on a short

20   circuit problem, and the further away you get, that

21   impact reduces to some de minimis level. But now you're

22   associating the physical location of generators with the

23   local load, which in a market environment there is no

24   direct relationship between a generator and New Jersey

25   and the load that lives right around it. So we'd have

Page 144

1   to think about what those implications might be; I don't

2   have a good answer for you for short circuit.

3   MR. LeCOMTE: Thanks.

4   And Amy?

5   MS. FISHER: So I have to quote Maynard

6   Keynes, which in our case is very appropriate because in

7   the long run we are all dead. And I don't mean that for

8   us as mortal beings, although it's true in that case as

9   well. But I mean it in terms of the companies we

10 represent sitting here. The fact that in some

11 alternative universe we will be able to recognize the

12 benefit of a $1.2 billion project is really very cold

13 comfort for a company that's faced with costs that are

14 simply in excess of its revenues. I think that if the

15 ex ante formula that we're trying to solve for is

16 important to people, then it needs to work, not most of

17 the time but all of the time. So we can make that

18 happen in two different ways: We can either take the

19 time and effort and not say "it's complicated" or "maybe

20 we won't use it very much," to try to get that ex ante

21 formula as close to correct all the time as we possibly

22 can, or when it doesn't work the people who are affected

23 are going to come to FERC or the courts to get redress.

24 And I think that's the question we need to answer here.

25 And failure to really dig hard into this formula means

1   that's how it's going to be addressed in the future.

2   MR. LeCOMTE: Thanks.

3   Esam?

4   MR. KHADIR: I would just like to make a

5   caution regarding carveouts for anything on the

6   solution-based DFAX. As I mentioned in my presentation

7   and as we discussed here today, if we take a look at the

8   short circuit issues you'll see that the short circuit

9   is not the only driver; you have several drivers,

10   including thermal drivers. If you take a look at the

11   stability, stability is not the only driver. For

12   Artificial Island there is a stability as one of the

13   drivers. And the high voltages at Artificial Island was

14   also another driver. And you're going to bring in a lot

15   of arguments, a lot of disputes, and even hearing a lot

16   of issues in the future. Should we use the stability

17   carveout or should we use the voltage as the

18   determining, and keep it in the DFAX? Same thing with

19   the short circuit project, should we use the thermal

20   drivers or should we use the short circuit drivers?

21   Thank you.

22   MR. LeCOMTE:: Thanks.

23   I actually have a question for Takis as a

24   follow-up. I'm going to stay away from the merits of

25   other proceedings. But to the extent that -- the

Page 146

1   cautionary tale on carveouts and the transmission owner

2   proposal to carve out from cost allocation certain

3   proceedings, tell me the consistency there.

4   MR. LAIOS: There, at least in my mind,

5   needing to take aback, obviously I'm representing the

6   PJM transmission owners here. My response to that

7   question would be basically all the other items we're

8   talking about here, we're talking about requirements

9   that apply to the entire PJM footprint. NERC

10 reliability standards apply to the entire footprint; PJM

11 planning procedures apply to the entire footprint. In

12 that particular situation you're talking about something

13 that applied to one zone. So therefore I view, at least

14 in my case, differently from the carveouts that we're

15 talking about here. Here you're talking about a short

16 circuiting that can happen anywhere in PJM in order to

17 address a requirement that PJM applies consistently

18 throughout the PJM footprint. While in the other case

19 you're talking about a particular local transmission

20 entity choosing to -- because of unique needs that they

21 may have in the local area, have essentially a driver

22 that's unique to that zone. So it's not whether it's

23 short circuit thermal or voltage, but what is the need

24 that that particular entity's trying to address in their

25 particular zone.

1   MR. LeCOMTE: As I said, I want to stay away

2   from the merits for that.

3   If I can follow up with a question for Steve

4   on that. So, if I were to look at the matrix, that

5   end-of-life, aging infrastructure and the allocation

6   methodologies indicated, there is a solution-based DFAX?

7   MR. HERLING: Yeah. And the reason for that

8   is typically you're replacing a line with another line

9   typically with more capability. But it's based -- once

10 it's built, it looks just like any other new line. You

11 can readily measure the use of the line. You could just

12 as easily have needed to rebuild the line based on some

13 thermal criteria violation. So once the solution is

14 there, the use is readily measurable, and to me it kind

15 of makes sense that you would continue to use it, the

16 solution-based DFAX, as the appropriate measure of the

17 beneficiaries.

18   MR. LeCOMTE: Thanks.

19   Mayer?

20   MR. SASSON: Today I find that I have agreed

21 a lot with what Steve has said except this time. Now I

22 disagree with him. Where is the violation that you

23 mentioned, end-of-life of a particular line? Who caused

24 that violation? That's the question we need to ask

25 ourselves. Is it the load that was using the flows that

Page 148

1   were going to certain loads? Did they cause the end of

2   life?

3   MR. LeCOMTE: Mayer, I want to make sure I

4   understand, because to the extent we have the

5   solution-based and we identified beneficiaries, we've

6   tried to stay away I think that the solution-based

7   mechanism as they've clearly identified drives to the

8   identification of beneficiaries, not problems

9   identifying the universe of potential causes.

10   MR. SASSON: Ron, I fully agree with you

11   that solution-based DFAX over a transmission line will

12   identify the users; that is a given. However, that is

13   not the real question I think we should be asking

14   ourselves, which is: Why are we doing the project? And

15   if you have an end of life, this line has been there for

16   40 years, is breaking apart, et cetera, we can't rely on

17   it anymore, we got to replace it. Whether we replace it

18   in kind or we are doing it, we might as well do a better

19   line so -- more capacity line for the future.

20   But was that the purpose of the line, to

21   serve the load in a sense that those loads caused the

22   problem? Other than they didn't, that goes to the

23   question -- I think also the answer I gave to Valerie,

24   which in that case I did agree with Steve, when he said

25   only stability in this case we'd put a line, or to the

1   -- peninsula, we could have put it to Philadelphia or to

2   Newark. So depending on the solution we charge

3   different people, is that a fair approach? Who caused

4   the problem? So it's almost like they're charging an

5   innocent bystander because he was in Newark and he's

6   there, he's the one I'm going to charge. "Wait a

7   minute, I had nothing to do with this issue." I think

8   that's the thing I'd like us to think about a little,

9   and that's why we came back in our opening remarks and

10   said you look at the nature of the problem and for

11   non-flow you look at what is the intended purpose of the

12   project.

13   MR. LeCOMTE: I am always cautious when

14   somebody asks their question, so that they can answer

15   that. So --

16   MR. SASSON: It was by the thoughts that

17   were given --

18   MR. LeCOMTE: Thanks.

19   Okay, I think I want to start by saying --

20   start by -- finishing by saying I appreciate all of the

21   panelists, all of the comments, and in particular all of

22   the people that have sat in the room and listened to

23   quite a long dialogue about the Commission's questions

24   here and the comments that we heard. I really do

25   appreciate all of the participation today, and while I

Page 150

1   said I don't speak for the Commission, I think the

2   Commission would support that comment. Thanks

3   everybody.

4   I indicated that we're going to set up a

5   schedule for post-conference comments and I'm going to

6   backtrack on that just for a touch because I think we

7   just want to regroup and see if we have any additional

8   questions that we would want to include in those

9   comments, and we would actually need some time to think

10   about that. I will say that to the extent that we have

11   comments, that we have questions, I would like you to

12   make sure you focus on the questions we ask. We've read

13   all of the comments, we heard all of the comments today,

14   and repetitive comments are repetitive. So with that

15   detail, I'd like to say thanks to everybody and I think

16   we'll conclude for today. Thanks so much.

17   (Whereupon the FERC technical conference

18   scheduled for 10:00 a.m. on January 12th, 2016, was

19   concluded at 3:30 p.m.)

20

21

22

23

24

25

A

a.k.a 56:16
a.m 2:8 4:2 150:18
aback 146:5
abeyance 107:24
ability 26:2 48:8
   89:19 123:25
   140:7
able 26:1 41:21
   50:22 86:6,10
   89:23 144:11
above-entitled 2:7
absolutely 52:22,25
   140:20
absurd 50:25
AC 47:19,20 65:18
accept 32:15 110:10
acceptable 110:6
accepted 12:7 89:2
access 22:14
accessible 8:1
accomplished 15:14
account 72:21 76:11
   76:13 80:7
accrue 110:25
accrued 24:20
accumulated 84:22
   98:23
accumulation 79:17
   80:5 81:2 84:19
accurate 4:24 42:2
   78:3 129:24
Ace-Federal 3:25
acknowledge 98:10
Acknowledgement
   31:19
acronym 114:21
act 17:12 20:8 34:13
Adams 3:4 5:14,14
add 10:17 26:9 29:7
   79:13,23 88:9,19
   88:20,22 115:21
add-on 133:11
added 10:18 73:3
   79:20 98:25 123:9
adding 79:21
   105:13
addition 13:8 26:21
   79:2,4 138:13,16
additional 20:25
   22:24 23:6 32:2
   62:24 63:1 103:4
   109:19 127:18
   134:19 138:18,20
   150:7
Additionally 71:18

address 7:18 19:7
   22:19 23:19 29:8
   33:15 34:23 40:23
   56:10,23 69:15
   76:21 85:3 97:23
   97:24 104:16
   111:8 119:7,10
   121:25 122:2,17
   141:21 146:17,24
addressed 22:22
   33:16 39:12 42:13
   73:23 111:14
   112:3 118:15,18
   145:1
addresses 40:15
   100:7
addressing 4:14
   7:11 41:7 87:4
   121:22 127:7
adds 44:11
adequately 41:16
adjust 20:9
adjustments 87:18
administering
   32:15
administrable
   103:23
adopting 17:16
advance 17:5 26:2
   54:23 62:19
advantage 26:4
   140:6
advantages 24:19
   140:9
advisory 58:21
   115:7
advocate 6:15 33:7
   57:18 104:5
advocating 18:5
   140:19
affect 129:20,22
affective 119:11
affirmative 17:14
   121:13
affirmatively 70:9
afternoon 7:22
   15:25
age 30:21
agencies 35:10
   36:17
agency 34:11
agency's 36:11
agenda 60:13
aggregate 79:23
aging 9:7 40:19
   92:13,21 120:15

   120:16 147:5
ago 105:2 106:23
   113:2,6 134:21
agree 14:16 46:17
   148:10,24
agreed 25:2 49:21
   55:22 147:20
agreement 22:18
   32:5 50:4 72:13
   72:14 94:23
   103:20 105:24
Ah 97:14
ahead 39:22 60:14
   69:8 83:13 88:24
Airport 27:21
Alexandria 3:25
align 55:19
aligned 112:23
aligns 36:22
Allentown 137:1
allocate 26:17 51:7
   58:8 59:22 67:5,6
   68:20,23 82:22
   96:22 99:8 102:23
   103:7,16
allocated 8:13 21:19
   22:4 23:2,5 26:19
   30:10,24 33:24
   34:1 35:1 47:11
   47:25 52:21 53:17
   53:18 54:19 56:3
   56:17 78:21 79:7
   81:5,17 99:1,4
   102:16 112:2,5,9
   113:24 125:20
   127:21 128:13
   132:23 133:4
allocates 22:7 42:8
allocating 9:6 12:17
   17:22 36:1 49:11
   70:2 95:12
allocation 4:4,13,17
   7:9,14 8:12 11:22
   11:25 12:5,8,12
   12:16 13:1,8,14
   14:2,6,10,22,24
   15:4,6,7,11,14
   16:8,23 17:2,10
   17:17 18:18,24
   20:9,11,14 22:15
   23:8 24:5,21
   26:13 27:5,10,13
   28:5,15,19 32:17
   34:9 35:2,18,24
   36:5,9,9,22,25
   37:2,4,6,21,23

   38:13 41:5,10,25
   42:1,13,17 46:5
   49:5,7 50:16,19
   52:6,8,9,12,22
   53:7 54:20 55:10
   56:3,6 58:3 59:13
   59:15 61:9 63:6
   66:16 68:14,17
   75:2,2,5,13 76:12
   78:8,11 79:25
   80:7,10 89:3,8,13
   94:19 95:4,18
   99:15 101:22
   102:8 103:4
   107:14,19,22
   108:3,5 111:5
   112:15 115:10,25
   116:2,24 119:19
   124:11,16 126:7
   127:22 128:20
   134:5,11 138:25
   139:16,24 140:4
   142:7 146:2 147:5
allocational 128:23
allocations 13:25
   14:17 17:12 19:24
   20:5 22:17 24:3,4
   24:8 25:8,12
   26:15 27:2,3
   28:20 30:14,17
   31:10 38:17 39:12
   46:22 49:9 50:25
   55:15,18 58:13
   59:3 98:25 106:8
   125:5 127:16,18
   128:1,4 140:8
allow 7:5 25:16
   30:24 48:11 49:14
   82:7 102:25
   135:17
allowing 30:20
   32:25
allows 47:12 84:12
alterations 15:5
alternate 59:12,14
   59:18
alternative 4:17
   7:13 12:11 13:16
   15:22 59:21 62:8
   99:9 144:11
amorphous 125:14
amount 15:9 18:21
   43:17,18 55:7
   72:19 73:3 77:22
   83:8 103:2 106:4
   106:23 110:13,18

   124:18
amounts 123:10,13
amps 80:18,18
Amy 3:19 6:18
   22:11,12 33:2
   46:18 53:3 98:4
   98:18,19 124:22
   143:2 144:4
analogous 74:4
analogy 74:7,20
   76:19
analyses 93:16
analysis 16:6,7,11
   18:5,7,17 19:6,23
   20:6 31:6 34:4,5,6
   35:3 36:7 37:9,11
   41:18 45:14 65:17
   69:2,6 73:5 87:12
   93:11,17 94:10
   104:22,24 105:2,4
   105:15,23 106:2,8
   106:10,15,18,24
   107:1 108:9,20
   109:3,5,7,9
   118:16 121:6,7
analytically 93:25
   94:12 116:25
   143:12
analyze 41:21
analyzed 97:13
ancillary 106:3
angular 78:15
announced 7:22
annual 37:1 41:12
   52:14,17 77:13
   103:24
annually 42:10 63:4
answer 16:7 17:11
   37:16 54:1 62:13
   70:8,15 71:8 75:5
   76:7 96:16,23
   108:1 124:8,25
   126:9,16 131:12
   140:19 141:2
   144:2,24 148:23
   149:14
answered 107:13
   141:4
answering 74:8
ante 144:15,20
anticipate 123:18
anymore 63:1 71:1
   148:17
anyway 106:7
apart 71:13 148:16
apologize 47:2

appearance 13:22
appears 29:22
appendix 133:24
applicable 35:25
application 24:9,24
  25:13 26:7 76:5
applied 13:1 24:4
  54:1 72:23 113:4
  146:13
applies 27:4 146:17
apply 12:13 18:7
  45:2 49:25 50:1
  61:17 75:19 93:13
  93:14 113:14,21
  116:8 119:19
  146:9,10,11
appreciable 110:13
appreciate 46:16
  65:12 95:23 98:17
  101:8 107:5
  124:23 142:25
  149:20,25
appreciated 11:16
approach 9:5 18:1
  24:3 37:23 41:5,6
  41:11 42:5,8,9
  84:23 100:7,9
  101:2,4 102:7,10
  102:13 103:12
  104:8 139:2 149:3
approaches 123:14
appropriate 8:21
  9:5 36:13 37:15
  37:20 38:15 52:2
  53:6 54:2 59:9
  66:11 67:1 69:1
  87:3,4 90:14
  102:7 110:19
  144:6 147:16
appropriately 36:4
  115:14 133:4
appropriateness
  42:13 104:10
  112:8
approval 27:13
approve 119:18
approved 47:7
  95:10 106:21
approximately
  33:23 34:24 56:4
approximation
  78:24
arbitrarily 13:5
arbitrary 15:19
  95:9
area 33:9 42:20,23

43:11,13,24,25
  44:18,23 57:16
  72:7,17 73:3,6
  103:8 122:20
  123:1,5,25 124:3
  130:23 146:21
areas 44:7
argue 40:11,13,21
  91:15 105:22
  142:7
argued 14:19 16:20
  20:4 142:16
arguendo 129:13
argument 89:24
  90:3 138:2 142:23
argumentative
  110:22
arguments 145:15
arising 58:8
arose 134:20
arrangement 26:5
artifical 42:21
  56:14
Artificial 12:15
  16:14 19:20 22:4
  28:5 33:9,13
  34:21,25 35:6,12
  35:18 37:18,24
  39:22 40:8,12
  42:18,19 43:21,24
  44:10,11,17,20
  45:22 55:23,24
  56:6 57:4,9,15,16
  57:19 59:21 60:3
  68:24 69:2 88:10
  91:2 93:21 101:15
  101:21 102:3,14
  102:16 103:16
  104:7 109:6
  110:12 116:10
  117:14 118:25
  124:10,14 136:22
  136:24 145:12,13
aside 123:24
asked 51:4 96:16
  105:5,19 108:10
  132:2 140:16,17
  141:2,12
asking 50:6 66:20
  120:9 148:13
asks 149:14
aspect 133:10
assessed 30:25
assessing 27:9
assessment 32:16
assessments 29:13

assign 62:14
assigned 26:11
  28:14 78:25
associated 9:21
  48:15 83:25 84:9
  89:19 101:14,24
  103:5 117:18
associates 25:25
associating 143:22
assume 108:13
  126:1,11
assuming 119:11,15
  129:12
assumptions 50:25
  109:7,8,13
assure 32:23
Athenia 73:1
Athwal 5:16,16
Atlantic 36:1 94:6
attached 124:18
attacked 14:7
attempt 51:7 52:13
  61:20 112:11,20
attempted 88:15
attempts 14:10
attending 4:5
attract 29:13
attractive 63:7
attribute 80:13 90:6
  95:18 106:13
  117:3
attributed 57:15
availability 59:25
available 12:1 13:21
  61:7 70:17 134:5
avoid 28:11 74:17
avoiding 42:6
avoids 45:25 61:3
aware 29:20

_____
B
_____
B 91:18,19 136:10
  136:10,12,13
B5 34:6 37:2,22
back 8:11,24 18:3
  29:17 31:13 47:20
  60:16 61:20 64:23
  64:24 72:23 77:17
  79:20 80:14 83:4
  84:10,22 88:7,11
  90:3 98:5 99:20
  104:4,18 107:7
  111:19 113:12,25
  114:4 115:16
  121:23 123:16
  129:2 131:15

135:23 140:1
  149:9
backed 64:19
background 47:17
backtrack 150:6
backup 71:14
bad 27:2,2,5 129:14
  130:22
badly 130:19
balance 88:4
balances 27:8
bank 86:6
bargain 25:1
base 26:10 48:5
  67:6 76:2,6 87:3
based 8:9 12:7
  13:21 22:21 35:3
  35:18 36:25 37:6
  37:15 41:10 55:3
  56:15 58:14 59:11
  59:22 60:11 61:6
  64:14 66:17 67:5
  68:15,15,20 74:22
  75:9,13 76:15
  77:23 78:5 80:2
  94:23 95:14 99:4
  103:17 106:16
  112:24 119:20
  139:24 140:4,8
  141:3 147:9,12
based-DFAX
  142:19
based-type 68:17
baseline 40:9,15,22
  41:20 44:14,14
basically 41:24 43:1
  63:16 64:16,18
  85:7 107:16
  108:12 128:16
  146:7
basis 13:14 18:20
  22:5 31:9 38:20
  38:22 41:12 47:11
  50:19 77:13 94:20
  94:24 101:23
  103:24 106:25
  110:17 115:24
  119:5 129:5 132:9
  134:10
bearing 27:24 31:5
beginning 140:21
behalf 6:12 33:5
  54:13
beings 144:8
belief 8:20 29:22
believe 9:4 14:10

15:3 22:13 46:9,9
  51:7 58:23 61:13
  92:18 108:18
  115:17 120:4
  125:17 136:17
believes 20:11 38:11
  55:13 58:6 136:17
belongs 16:21
Ben 3:11 5:25
beneficiaries 16:15
  17:19,19 18:9,10
  20:15,16 21:21
  22:8 31:18 41:17
  42:10 61:2 66:12
  68:25 74:22,24,25
  75:3 76:3,6 89:4,6
  90:14 91:25 92:14
  98:24 99:7 106:6
  115:14 122:5,6,12
  135:10,24 136:4
  137:25 138:10
  139:3 143:10
  147:17 148:5,8
beneficiary 20:20
  21:17 42:21 73:20
  138:12,19,19,20
beneficiary's 143:8
benefit 4:25 8:23
  10:1 12:18 13:12
  17:24 18:12 19:18
  25:19 27:22 30:15
  30:18 32:1,8 35:5
  55:20 59:24 60:3
  65:22 67:6 71:16
  89:18,23 90:3,7
  90:10,11 91:1,12
  91:16 93:6,10
  94:3 95:3,16
  100:13 101:19
  103:9 106:19
  111:22 114:2
  117:17 125:14
  127:3,6 135:4,14
  135:18 137:17
  144:12
benefiting 135:20
  136:3
benefits 12:7,21,23
  13:3,17 15:21
  16:10,17,19 17:15
  19:5,14 20:1,13
  21:6 22:19 23:13
  23:24 24:9,15,18
  25:7,9 27:7,25
  28:3 31:8,9 34:4,7
  34:10 35:8,11

36:22,25 37:4,7,9
42:9,19 44:10
48:7,25 49:23
53:22 58:1 59:23
61:11 63:13 64:2
76:4 84:11 89:17
89:19 90:9,20,21
90:24 91:3,13
92:1,1 94:20
95:15,18 101:13
101:16,24 102:11
102:18,19,19
103:14,15,17,22
104:1 106:3,13,15
109:10,18,19
110:8,9 117:3,5,8
117:10,11,17
121:24 122:4,12
125:2,7,12,12
127:2,5,6 135:2,5
135:8 137:19,24
139:19
benefits-based
37:23
benefitting 15:18,19
68:19 69:4 90:5
102:24 124:13
Bergen 16:13 47:24
49:15
Bergen-Linden
27:20
best 11:25 13:20
15:20 30:10 61:6
61:16 65:6 84:24
90:25 109:14
better 41:25 68:1,23
74:13 101:7
122:10 134:7,18
148:18
beyond 7:20 129:15
130:23 134:24
BFT 73:8
bidirectional 47:5
bids 32:12
bifurcate 134:21
big 72:2,5 80:17
120:19 123:18
132:7 138:21
140:7,9
bigger 24:24 134:18
biggest 39:5 49:15
94:8,11
billed 52:16
billion 28:16 33:22
144:12
Birmingham 73:1

bit 18:13 42:18 43:6
44:20 45:14 46:20
52:4 60:14 78:16
85:5 87:2 88:14
89:1 90:19 93:14
98:6,8,15 107:7,9
121:24 124:9
130:1 143:17
blatant 127:17
BLC 16:13,24 19:7
20:19 21:8,12,15
40:14,17 42:9,14
65:20 83:8 98:16
133:8
blends 139:2
blow-up 125:20
blows 130:14
blue 43:2,5
Board 27:12 29:2
34:14 35:20 36:3
95:10 119:18
Bob 6:12 33:3,5
38:2 101:10 104:5
105:3
body 15:8
borne 125:16
bottom 52:12
bounceback 8:2
boundaries 21:25
brand-new 124:16
break 58:17 60:14
60:15,15,16 70:12
83:21 86:8 129:8
131:14
breaker 9:20,21,24
10:23 21:4 70:25
71:16 72:2 79:14
79:15,16,17,24
80:1,9,17,23 81:1
81:4,14 82:3,15
84:9,18,21 112:15
112:17 123:14,22
125:21 129:20
130:12,14
breaker-shared
22:5
breakers 9:17 16:25
19:12 21:9 70:11
70:14,14,17,22,24
70:25 71:5,11,13
73:10 79:5 80:21
83:10,15,25 84:2
129:16 134:15
breaking 148:16
brief 113:10
briefly 49:9 110:5

113:12 133:7
bring 51:18 115:7
145:14
bringing 16:4
brings 85:8
broad 51:1 69:21
broke 84:21 98:7
broken 141:11
brought 17:5 53:3
83:14 127:8
bubble 63:14,16
build 9:19 10:24
11:3 21:4 27:6
39:8,9 66:1 67:18
67:21,24 71:19
72:15,25 79:3,6
91:19 98:13
113:17 115:19
123:11 135:3,18
136:11
building 47:20,24
76:22 123:19
136:23
built 65:21 73:14
77:5 94:15 97:2
117:9 132:13
135:6 136:25
137:1,2 147:10
bulk 31:3,5
bump 123:11
bunch 51:11,11
82:1
Burgundy 65:22
73:15
bus 73:2,2 85:9
88:21
buses 94:1
business 50:18
but-for 29:9,10
bystander 149:5

———————
C
———————
C-O-N-F 7:25
calculable 91:11
calculate 26:2,16
91:13
calculated 90:23
calculation 79:15
80:12 84:10,11,13
84:15 100:10,25
101:2,4 112:16,20
112:24
calculations 12:24
call 7:23
called 11:12 32:4
46:13 82:4 123:22

calls 23:9
camel's 84:22
canal 71:20
capability 21:9
80:21 81:14 82:16
83:15 84:17,20
99:25 123:14,15
130:12 134:3,5,19
134:22,23 147:9
capable 36:25 47:5
103:23,24
capacity 30:7,8
31:25 33:11,12
43:10 45:9,24
47:12 48:6,9,10
48:12 52:18 60:1
70:12,14,23,24
84:17 103:21
109:18,21 148:19
capacity-related
103:15
capital 52:23
105:15,15
captive 48:4
capture 41:16 77:15
captured 9:12 117:8
117:19,20
captures 42:10
capturing 136:18
card 64:11 96:6
cards 95:20
care 81:4
careful 74:10
carry 70:20 71:4
76:18,19,23 84:3
84:5
cars 67:18 76:19,23
76:24
carve 146:2
carveout 142:6,8,9
142:11,17 143:6
145:17
carveouts 142:18
145:5 146:1,14
carving 40:5 41:24
142:2
cascade 130:16,20
case 10:23 12:15
21:9 26:25 29:5
29:17 36:1,5
37:18 49:11 63:15
66:9 67:3 68:6
70:9,16 82:23
93:1 104:6 109:14
114:18 116:10
117:14 126:4

133:14 136:22,24
144:6,8 146:14,18
148:24,25
cases 9:16 25:3
107:23 130:21
catchup 80:2
categorically 20:7
categories 8:8 9:1,2
9:7 40:5 58:5,11
58:22 59:16 62:2
64:14 77:11 79:1
92:25 114:10
119:25 120:11
135:14
categorization
69:22
categorize 14:11
categorized 41:2
category 4:11,18
7:8,15 16:5,21
36:21 37:9,18,19
40:24 46:2 56:10
56:13 59:4 61:8
61:13 93:4 96:18
96:19 102:2,4
114:8,16 115:4
141:3,5
caught 97:20
causal 10:21 89:1
causation 12:17
13:14 49:7,24
63:6
causation-type
100:9
cause 10:9,11 12:18
15:2 51:12,17
61:18,23 62:13
75:1 78:10 79:1
80:8 81:2 91:17
130:3,4,18 138:13
138:16 148:1
cause-out 46:2
caused 23:15 39:6
39:25 49:20 51:8
57:12 61:21 62:7
62:20 64:16 65:13
65:15 66:22 67:4
67:13 75:15,25
76:13 89:15 90:4
98:10 135:25
136:13 137:6
138:8 140:5
147:23 148:21
149:3
causers 136:4,8,14
136:18 140:25

In the Matter of: PJM Interconnection L.L.C. - January 12, 2016

Page 4

causes 14:17 61:4 61:17 62:11 68:3 80:13 81:13 148:9	**charges** 13:6 50:1 **charging** 67:11 149:4	134:15 136:20 138:4 141:7 142:13 143:16,20 144:2 145:8,8,19 145:20 146:23	**coincidently** 94:4 **cold** 144:12 **collective** 11:21 **collectively** 25:2 **column** 134:8	149:21,24 150:5,9 150:11,13,13,14 **commission** 1:2,13 1:14 2:2,9 4:21,22 6:11,13,14 7:7

causing 14:15 50:12 51:5,13,15 79:19 82:15 89:1 98:9 136:10 137:7
caution 84:14 145:5
cautionary 142:2,21 146:1
cautious 15:22 149:13
center 52:8
central 22:23 39:18
certain 14:4,5 37:4 38:19 51:13 52:21 64:10 66:10 74:4 77:10 105:3 111:23 116:20 146:2 148:1
certainly 105:16 117:4,13 120:5
certainty 54:21
certification 46:2
cetera 148:16
CETL 109:21
challenge 20:5,11 89:7 94:13 95:5
challenges 10:7
challenging 102:6 125:8
chance 45:16 96:7,9 126:8
change 10:22,23 15:6 23:9 50:5,13 51:3 72:2 80:16 80:24,25 81:1 88:12 90:20,22,24 92:2 99:15 116:13 122:9
changed 14:21 64:22 77:18
changes 15:23 29:9 42:10 50:11 63:2 79:17 80:3,22 81:2 88:8
changing 122:12 140:8
characteristics 110:10
characterization 18:2 111:24
characterize 90:19
charge 13:7,7 67:10 67:10 108:19 141:15 149:2,6

chart 133:23
cheap 119:13,15
check 11:14 83:17
checks 27:8
chewed 99:24
chime 121:22
Chip 125:17
Chip's 125:3
choice 65:25 66:2
choose 30:5 65:19 133:13
choosing 146:20
chose 89:21 132:7
circle 118:5
circuit 9:13,15,17 9:20,21,23,24,25 10:10,12,23 17:1 19:8,12,14 20:19 20:21 21:3 22:22 23:3,7 30:23 38:22,24 39:7,9 39:10,11,24 40:3 40:17,18,20 41:19 41:25 51:3,10,13 51:19,23,25 52:3 59:1 63:11 67:7,8 67:9,23 68:6 69:23,24 70:9,12 70:16,22 71:9 72:1,7,9,10,18 73:3,9,17 74:12 74:23 77:2 78:5 78:24 79:14,15,17 79:24 80:6,17 81:4,13 82:18 83:9,14,17,24,25 84:2,8,8,17,20 85:5,6,8,18,22 86:25 87:14 88:8 88:9,16,19,20,22 90:16 91:22 92:12 92:24 93:13,15 94:10 96:12 98:6 98:9,11 99:21,23 100:14 104:9,12 111:5,11,11,21 112:15,17 113:4 113:11 121:25 122:3,15,16 123:8 123:12,21 126:18 129:13,19 130:11 130:12,25 131:2,5 132:3,20 133:9,16

circuit-related 112:1
circuit-type 78:21
circuiting 146:16
circuits 19:8,10,13 20:25 21:7,12 40:1 45:8,9 51:18 71:2,5 72:15 73:14 83:5 111:12
circular 14:18
circumstance 119:6
circumstances 114:24 115:5 130:19 131:11
City 36:1 83:1,2,11 83:13 94:6
claim 26:12
claimed 17:25
claiming 12:18
clarified 23:22
clarify 98:7 104:22 114:5 125:2
clarifying 70:5
class 82:5 143:7
classes 142:14
classified 92:15
clear 8:10 18:4 26:6 27:22 44:23 75:5 75:10 81:9 82:12 89:10 102:3 118:17 125:8 126:17 133:8 140:19,21 143:18
clearer 102:3
clearly 17:7 21:16 21:20 24:17 51:2 52:2 56:13 57:9 58:7,15 87:24 88:22 89:19 105:20 122:20 135:20 148:7
close 33:11 73:2,4 81:12 123:19 144:21
closed 36:10
closer 44:20
closest 44:1 94:8
closing 73:2 85:9 88:21
cluster 118:3
coincidental 95:2,17

combination 33:19 88:1 116:11
come 41:9,14 50:13 60:16 73:11 82:8 91:24 96:25 100:12 101:7 120:5 131:15 134:11 139:1,5 144:23
comes 44:22 81:19 97:21 107:17,19
comfort 144:13
coming 69:6 72:18 73:13,18,25 85:18 85:23,24 102:9 108:20 110:6
commend 54:22
commensurate 17:15 20:13 24:9 24:15 25:9,11 30:18 42:8 89:9 89:10,14,15,16 104:2 110:8
comment 51:9 53:25 65:9,10 66:4,6 68:10 78:22 80:4 82:17 98:18 99:11 101:10 107:1 112:8 113:9,10 125:3 126:9 140:11 143:5 150:2
commenters 12:14 13:11
comments 4:20 7:6 7:17,21 8:7 11:23 12:1,4,9 13:15 28:4 36:14,15 45:12 46:18 49:6 53:5 54:9 60:10 60:11,12,25 64:9 64:11 65:11 68:13 68:23 69:11,11,16 69:20 74:23 86:23 87:8 93:10,11 95:23,24 98:6,8 98:20 99:20 101:13 107:4,7 110:22 118:12,13 133:25 135:2

12:3,10 16:3,24 17:14 22:16 25:3 25:25 29:3 32:22 33:6,7 45:15 54:14,16 55:1,12 64:8,21 103:10,11 103:12 108:10,11 108:16 110:4 141:2 150:1,2
Commission's 7:19 7:20 30:12 34:3 37:17 46:11 58:4 59:14 66:10 149:23
Commissions 121:5
Commissions/Age... 3:21
committee 115:8
common 85:23
Commonwealth 35:4
communication 5:6
community 58:21
companies 11:19 44:5 52:25 54:19 144:9
company 1:7 46:13 82:25 144:13
comparable 31:16
compare 94:14 105:6
compared 95:6 117:1 127:17
comparison 109:5,5
compelled 100:22
competing 33:18 48:20
complaint 18:1
complete 32:18
completely 26:18 41:14
complex 44:13
complexes 39:23
complicated 99:8 144:19
component 14:9 28:5 49:15 57:5 70:4,6 74:3 84:4
components 14:1 84:3
comports 37:7

202-347-3700　　　　Ace-Federal Reporters, Inc.　　　　866-928-6509

Con 3:18 6:19 16:2
  18:4 20:4 22:6,18
  82:23,24,25 83:2
  83:3,6,7,11
  102:13 113:21
Con-Ed 51:22 52:9
  52:11 72:12,16,18
  72:24 85:8,21,22
  85:24,24
concede 25:1
concept 48:23
concepts 31:13
concern 13:10
  24:13 74:5 80:23
  87:1 111:9 116:5
  142:10
concerned 70:25
concerns 12:8 26:8
  26:10 35:22 36:12
  39:14,23 53:4
  54:20 59:12 92:10
  92:11 111:4,8
  114:6,13 115:14
conclude 150:16
concluded 150:19
conclusion 20:24
  45:12 46:1
condition 116:15
conditions 32:3
  106:22 140:9
conduct 30:3 37:3
conducted 34:4
  37:10
conducts 34:6
CONF 7:25
conference 2:7 4:5,8
  4:19,21,23 5:1
  7:17,21 11:24
  16:4 17:6 54:24
  133:24 150:17
confident 59:18
confirmed 32:10
confusion 126:25
congestion 43:12
  67:20 95:2,6
conjecture 14:19
connect 47:17 72:15
  119:2
connected 21:25
  129:21
connection 72:24
  85:10 97:20
consensus-driven
  25:24
consent 22:16
consequently 22:3

101:6
consider 27:13
  48:23
consideration 28:9
  31:24 127:20
  128:3,18
considerations 14:3
considered 11:23
  55:5 59:12 107:25
considering 27:18
considers 28:2
consistency 68:2,5,6
  75:23 141:1 146:3
consistent 35:19
  75:2 76:5
consistently 146:17
consists 44:16
consolidated 1:7
  32:5
constantly 50:12
  122:11
constitutes 36:21
  89:18
constraints 43:12
construct 84:12,25
  85:12 128:23
  129:1
containment 31:1
contemplated 98:16
contend 76:4
contends 28:8
contentious 26:20
contest 32:21
contested 34:20
  35:6
context 12:2 15:10
  87:9 102:14
  107:11
continue 11:24 36:6
  45:5 122:21
  147:15
continues 55:11,14
  122:21
contribute 123:9
contributed 84:19
  84:23 85:4 100:4
  100:14
contributes 18:22
  85:6
contributing 72:10
  83:8 84:7
contribution 31:24
  79:14 80:5
contributions 25:16
  72:9,18,19,20
  73:9,18,24 85:9

85:18,22 86:25
control 47:8,8 51:18
  87:18 88:4 119:12
  119:15
controlled 97:19
  118:24
controversy 14:24
convened 2:8
convergence 30:10
conversation
  131:20
conversely 32:6
convert 47:19,20
converter 47:16
cooperative 6:22
  54:14 55:3,4
coordinated 30:4
coordination 25:24
correct 70:7 85:20
  111:24 112:6
  115:12 117:13,23
  144:21
corrected 8:1
correctly 74:8 111:7
  141:19
correctness 38:17
corridor 16:13
  27:20
cost 4:4,13,17 7:9
  7:13 8:12 11:22
  11:25 12:5,8,12
  12:16,23,25 13:14
  13:25 14:2,5,10
  14:22,24 15:4,5,7
  15:10,14 16:8,23
  17:2,10,12,16
  18:17,24 19:24
  20:5,9,11,14 22:3
  22:14,16 23:8,11
  24:3,4,5,8,21 25:8
  25:12 26:3,13,17
  27:2,3,5,10,13,14
  27:25 28:2,5,13
  28:14,19 30:14,17
  31:1,5,9 32:17
  33:21,22 35:2,8
  35:18,24 36:9,9
  36:21,25 37:4,6
  37:20 38:13 41:5
  41:10 42:13,17
  45:21 46:4,22
  48:5,8 49:4,7,7,9
  49:24 50:7,16,19
  50:24 51:11 52:6
  52:8,9,12,18,22
  53:13,19,21 54:19

55:10,15,18 56:7
  56:17 57:18,21,23
  58:3,8,13 59:13
  59:15,22 61:9
  62:14 63:5 68:25
  76:12 77:3 78:8
  80:1 81:5 82:21
  89:3,7,13 94:18
  95:4,18 96:22
  98:25 99:7 101:19
  101:20,24 102:7
  102:24 106:8
  107:14,19,21
  108:3,4 110:12,25
  112:18 115:25
  116:2,24 119:19
  124:10,15,19
  125:5,19 127:16
  127:17,21,22
  128:1,4,13,20,22
  134:4,10 138:25
  139:16,24 140:4
  142:7 146:2
cost-allocate 141:13
cost-benefit 46:24
cost-effective
  119:17
cost-intended 22:7
cost-savings 48:5
costly 27:16,18
costs 12:19,25 13:2
  13:4 14:5,5 17:14
  17:22 20:12 23:2
  23:5,13 26:11
  28:11 29:8,9,10
  29:24 31:18 32:13
  34:10,25 35:11
  42:8 48:16 49:12
  49:19,25 51:1,5,8
  52:20 53:11 54:1
  54:17 56:3 68:20
  68:24 70:2 82:22
  95:13 102:15
  103:5,5,8,16
  104:2 110:16,17
  125:1,7,16 132:8
  144:13
Counsel 5:17 6:15
  33:8
count 99:6
couple 8:25 18:15
  42:24 60:22 72:11
  72:22 77:8 81:8
  108:9 125:25
  130:14 138:22
Court 3:25 51:3

courts 32:22 144:23
covering 42:16
covers 120:6
create 80:17 115:22
  138:24
created 100:12
creates 22:1 90:10
  117:13,14
creating 98:15
  99:25 100:6,16
Creek 56:1
creeps 123:6
crisis 45:25
criteria 8:19 17:1,4
  17:4 23:18 28:7
  45:3 56:16,20
  57:11 59:11 78:7
  90:1 115:20 133:2
  134:1 147:13
cumbersome 41:11
cumulative 86:24
  87:5
curiosity 111:3
curious 77:10
current 11:21,25
  19:11 20:22 22:24
  23:4 28:1 35:13
  37:1 55:10 62:9
  70:12 79:14 83:9
  108:3
currently 33:16
  47:6 120:7
currents 10:24
  30:23 70:22 77:2
  81:13 82:18 83:14
currents' 73:17
customer 19:10
  30:6
customers 32:9,12
  44:25 48:4 55:20
  57:1 90:1,3
  110:15 131:10
  135:20 136:2
cut 7:19
cutting 73:24

D

D.C 2:4 57:21,21
damage 17:3 20:23
  30:22 71:11,15
  74:12,15,17 124:1
  124:4
damages 23:15
data 77:23
date 36:10 103:10
  103:12 132:17

day 5:10 10:22 11:1
  11:6 52:19,20
  54:8 63:7 65:4
  66:21 90:4,25
  92:2
days 66:24
DC 47:19,20
de 25:13 31:10 53:9
  53:15 143:16,21
dead 144:7
deal 8:21 32:3
  114:24 120:19
dealt 134:12,24
debate 61:23 62:15
debating 142:11
decades 33:12 64:5
decide 89:17 93:3
  100:10 110:18
  138:20
decided 23:3 46:22
  73:5 83:13
decision 28:3 50:18
decisions 12:3
declare 13:5
decline 52:19
deeper 42:17
defensible 15:20
defer 11:9
definable 4:11 7:8
  36:21 37:17,19
  61:7,13 102:2,4
defined 58:14
defining 135:8
definition 13:3
definitively 65:15
degree 87:14
Delaware 1:12 6:11
  6:13,14 12:14
  33:5,7,10 34:3
  35:22 45:15 55:5
  57:7 105:5 108:10
  108:11 110:4
  121:5
Delaware/Maryla...
  3:21
delineation 12:12
delists 30:8
deliver 72:13
  122:24
delivered 29:16
delivery 73:7,8
  85:10,13
Delmarva 33:24
  34:2,8 35:1 42:20
  42:23,25 43:7,11
  43:13,17,18,20

44:7,8,12,15,16
  44:18,19,19,21,23
  44:25 45:7,18,21
  45:23 56:3,5
  57:12,13 58:2
  94:7 102:21
  104:13 109:13,20
  109:21 110:11,15
  110:25 117:15
  128:4,12,15,19
  136:24
delta 94:11
deltas 105:11
demand 19:10
demonstration
  121:13
dependent 44:6
depending 44:7
  62:12 124:3
  126:13,20 130:19
  141:6 149:2
depends 59:4 130:7
  131:4,10
depth 18:14
derivating 57:2
derive 135:6
describe 129:17
described 118:2,24
  135:24
describing 135:13
deserve 66:6
design 11:21 26:4
  27:23 111:17
designated 7:25
designed 13:11
  55:24 111:21
desired 30:11
detail 150:15
detailed 56:16
details 132:16
determination 24:5
  29:6 31:14 50:18
  50:22 52:11
determine 23:1,24
  29:7,19 30:9,25
  49:20 62:19 65:13
  65:14 68:18 69:3
determined 33:14
  118:7
determines 30:7
  98:24 118:9
determining 48:25
  61:3 103:21
  145:18
develop 37:20
  109:14,15

developed 33:15,20
  34:22 59:19 109:7
development 55:9
device 29:5,15
  115:21 119:12,16
devices 87:18
  118:25
devise 17:6
DFAX 4:13 7:9,25
  8:20,24 9:5,10
  10:1,7,25 12:24
  13:20 14:3,9
  15:16 16:6,7,11
  18:5,6,7,17 19:6
  19:22 20:6 25:5
  25:12 26:17 37:15
  38:11 40:6 41:4,6
  41:10 42:1,4
  44:24 46:3,4,25
  49:22 51:6 52:1
  53:6 55:11,14,16
  55:19,22 56:7,8
  56:17,19 57:2,17
  57:24,25 58:5,7
  58:11,12,24 59:2
  59:9,17 61:6,9,16
  62:8 63:4 64:19
  64:22 66:9,25
  67:5 73:19,20
  74:21 75:19 89:25
  90:21,22 92:18,22
  99:5,13 100:7
  101:4,8 106:10
  110:7 112:8,12,20
  112:23 113:3,14
  115:11,15 119:20
  121:9,17 126:14
  128:6,12 129:4
  132:24 133:4
  135:23 136:6,6,19
  138:9 139:19,20
  140:2,10,20,23
  145:6,18 147:6,16
  148:11
DFAXes 121:12
diagrams 45:2
dialed 4:6 7:4
dialogue 149:23
differ 41:13
differences 142:12
different 5:9,10
  22:2 23:22,24
  29:4 30:6 46:21
  54:3,4,5 62:21
  63:15,15,21 65:24
  65:25 66:24 68:13

91:9 92:7,24
  96:18,19 98:22,25
  99:7 106:5 107:10
  107:10,11 127:22
  128:2 133:12
  134:23 135:12
  137:5 138:24,25
  139:2 140:5
  141:18 142:15,16
  144:18 149:3
differentiation
  38:23 53:25
differentiational
  24:1
differently 14:11
  38:21 39:12 61:14
  90:19 124:9
  134:20 146:14
difficult 10:21 16:20
  78:17 86:19
  102:11
difficulties 61:3
dig 144:25
diminish 64:4
direct 78:13 79:25
  95:8 96:17 122:7
  143:24
directed 4:9 7:7
  129:10
directing 64:10
direction 103:9
  106:7,9,14
directions 83:19
directives 7:19,20
directly 55:21
  102:24 126:17
disagree 147:22
disagreement 49:5
disagrees 24:1
discard 12:20
disconnect 58:9
  121:15
discontinuity
  117:10
discreetly 111:7
discrete 88:8
discriminate 25:22
discriminatory
  19:25
discuss 18:13
  104:16
discussed 7:16 74:2
  104:23 141:1
  145:7
discussing 54:25
  76:17,21 142:11

discussion 15:24
  54:8,16 99:21
  117:5 121:24
discussions 12:2
  34:15 46:25 60:6
  107:22
disparagingly 29:1
dispatched 48:18
disproportionate
  128:17
disputes 18:3
  145:15
disruptive 86:13
  123:24
dissect 88:2
distinct 8:8
distinction 38:15
  114:6
distinctions 16:22
  38:25
distinguish 34:19
distinguishing
  38:23
distributing 18:25
distribution 4:4
  18:19,20,23 19:5
  55:4
disturbances 19:11
  22:1
disturbing 11:14
divert 70:21 77:2
divided 66:8
Division 6:14 33:7
divorced 112:25
divorcing 27:5
DLS 46:4
doable 62:17 106:24
docket 42:15
dockets 29:23 36:16
  111:10
doing 73:4 77:21
  81:3 108:25 109:4
  141:22 148:14,18
dollar 109:10
  113:20
dollars 33:22 72:3
  79:25 80:9,10,11
  93:19,23 95:2,6
  109:11,12 113:24
Dominion 6:22
  36:17 54:13
door 142:23
Doug 3:13 6:4
dozen 139:22
dozens 114:25
  139:21

dramatically 23:9
  54:3,4 127:22
  128:2
draw 74:20
drawing 142:4
drew 118:5
drive 30:10 76:1
driven 38:14,14,19
  39:3 40:22 59:11
driver 58:9,22 63:1
  64:14,17,23,25
  73:23 77:17
  111:12 121:16
  139:11 142:5,16
  142:24 145:9,11
  145:14 146:21
drivers 39:5 41:1,1
  58:14,18,18 64:1
  142:14 145:9,10
  145:13,20,20
drives 148:7
driving 63:12
drove 63:6,23 73:8
due 17:3 25:18
  71:14 74:12
duties 10:15,19
duty 78:5 79:4
  80:16,20,21 88:9
  88:19,20,22
  123:12
dwindles 143:16
dynamics 122:11

─────────────
          E
─────────────

E 105:15
e-mail 8:2
earlier 49:6 56:2
  60:16 86:23
  106:17 117:6
  118:24 121:24
  125:3 131:20,25
  133:10 137:20
early 55:17
earth 77:3
easier 88:7
easiest 129:19
easily 41:2 135:10
  147:12
east 5:21 6:5,6
  39:18
Eastern 36:18
eastside 33:9
easy 22:8 49:19
  64:23 96:23
  119:12
eats 84:20

economic 12:22
  28:7 34:4 35:2,5
  36:22,25 37:7,9
  37:23 46:23 59:23
  60:3 68:17 69:1,6
  69:11,16 93:10
  94:18,20 100:17
  100:20,25 101:1
  103:17 121:6
economically 48:18
  68:18
economics 52:4
economics-based
  101:22
economist 5:21
Ed 5:18 129:9
edge 5:4
Edison 1:7 3:18
  6:19 16:2 18:4
  20:4 22:19 35:5
  82:24,24,25 83:2
  83:3,6,7,11
  102:13 113:22
Edison's 22:7
EDWARD 3:6
effect 22:1 29:8
  55:17 63:3 86:25
  130:25
effecting 39:18
effective 27:15 36:7
  132:10
effectively 25:16
  48:7
effects 129:17
efficiency 23:19
  34:5 45:14 68:18
  93:16,17,20 94:3
  94:25 95:11,17
  99:2 101:15
  104:22,23 105:4
  105:15,23 106:2
  106:18 108:9
  109:6,9,14,15
efficient 27:14
  133:14
efficiently 7:18
effort 144:19
EI 46:3
either 8:18 44:2
  78:9 86:12 88:4
  92:20 112:3
  115:18 116:1
  130:25 144:18
EKA 72:8
EL15-18-001 1:7
EL15-67-000 1:18

EL15-95-000 1:12
elaborate 134:6
  143:9
electric 5:13,18 6:22
  29:4 54:13 55:3
  94:6
electrical 45:2
electrically 128:15
element 10:21 81:2
elements 8:13
  139:11
eliminate 26:10
  73:17 111:23
eliminates 27:8
eliminating 95:7
elimination 90:2
  135:25 136:5
embrace 142:22
emphasize 55:13
employs 25:6
encountered 42:7
end-of-life 147:5,23
endless 62:15
ends 106:13
energy 1:2 2:2 5:14
  5:24 6:3 16:12
  19:9,9,13 29:14
  30:2,6 35:3 45:24
  48:6,9,10,11 60:1
  103:1,2 118:4
  122:24 135:15,16
  135:18
energy-related
  103:22
engineering 12:7
  13:21 41:23 42:14
engineers 143:14
enhance 19:21,21
enormous 83:8
  106:23
ensure 20:12 67:2
ensuring 54:17
enter 79:4
entered 50:3
entire 14:10 21:15
  50:21 71:12 90:9
  118:20,21 122:8
  124:15 128:21
  133:8,15 137:5
  146:9,10,11
entirely 8:20 10:5
  11:2,8 92:4 98:13
  131:10
entities 15:18,19
  24:25 65:1 69:3
  127:20 129:2

entitled 30:19
entity 12:10 23:17
  84:16 146:20
entity's 146:24
environment
  143:23
environmental
  43:16
equal 25:18
equally 106:13
equipment 5:6
  20:23 30:22 50:10
  71:12,15
equitable 129:4
equity 35:20 102:17
  102:22
equivalent 31:10
ER14-1485-005
  1:24
ER14-972-003 1:22
ER15-2562-000 1:4
ER15-2563-000 1:5
Esam 3:22 6:23
  38:7 46:7 69:14
  71:25 85:2 88:21
  98:7 104:4,18
  108:7 109:25
  145:3
Esam's 46:9 98:8
especially 86:23
  87:9 111:4 143:6
essentially 34:5
  63:4 79:11 100:23
  106:11 111:22
  114:22 128:23,24
  142:5,19 146:21
establish 94:12
  112:12
established 4:18
  7:14 59:16
estimate 52:13
estimated 33:21
  56:2 101:20
et 148:16
evaluate 62:9,11
evaluated 13:25
  15:7 28:6
event 79:19 130:8
  130:20 131:1,1,4
events 77:23 130:10
eventually 80:19
everybody 4:6 54:6
  150:3,15
everyone's 126:1
everything's 88:2
evidence 15:8 58:16

evidenced 36:15
evolve 90:20 137:25
evolved 10:13
evolves 64:4
evolving 10:6 93:7
ex 144:15,20
ex-ante 4:17 7:13
  12:12 13:16 17:10
  24:3,4,10,11,13
  24:22 25:4,18,25
  26:1,23 37:7
  38:13 42:5 59:15
  61:25 67:5 99:10
exact 41:23 50:5
  65:23 81:11
  141:22
exactly 22:7 30:11
  35:15 91:20
example 10:10
  16:23 18:25 19:6
  27:19 39:7 59:6
  79:3 114:20
  143:19
examples 39:2 75:9
exceeded 130:11
exception 35:4
  36:18 37:13
exceptions 38:16
excess 144:14
excessive 20:22
exchange 12:22
exclusion 62:1
exclusively 31:18
executing 107:14
exempt 14:4
exercises 41:22
exhaust 119:24
exhausted 34:11
exhausts 120:6
exist 35:20 36:19
  120:2 122:21
existence 89:25
  135:21
existing 23:14 30:21
  30:22 31:3,16
  35:1 40:1 53:2
exists 20:21 21:20
  89:22 106:16
  119:19 129:13
expansion 23:23
  28:10 58:21 115:7
expansions 50:10
expect 49:22 120:24
  139:3
expected 55:20
expects 26:8

expense 24:6
expensive 50:23
experiencing 78:16
experiment 129:11
expert 81:20,22
expiring 50:9
explain 16:16 80:6
explode 123:23
explore 4:11 7:7
  16:4 69:1
extend 130:23
extended 73:16
extensive 33:17
  34:15
extensively 34:13
extent 7:23 24:4,6
  64:8 74:21 89:2
  103:14 106:5
  111:9,25 117:22
  118:13 130:15
  141:13 143:6
  145:25 148:4
  150:10
extremely 61:22
  102:11
eyes 77:21 128:17

F

face 90:8 124:19
faced 97:21 144:13
facilitate 30:13
  85:10
facilities 13:2,4
  14:23 15:17 28:13
  31:12,21,22 32:8
  46:20,23 47:4
  48:3 51:17 54:18
  59:16 61:2 65:5
  73:22 84:1,3,6,8
  85:6,24 89:5
  125:5 128:16
  129:21 134:15
  135:17
facility 4:16 7:12
  10:3,6 39:1 48:18
  53:10,17 61:19
  63:23,24 66:24
  67:12,13 68:4
  79:3 89:18,20,21
  89:22 90:22 91:17
  91:19 92:4 93:8
  94:15 95:4 110:13
  113:23,24 117:21
  126:21 134:3
  135:4,15 136:8,14
facing 102:21

104:13
fact 25:10,21 30:12
  34:21,24 37:2
  38:25 46:3 49:1
  57:23 67:4 75:7
  83:10 89:21,22
  100:13 107:9
  113:13 122:11
  136:15 137:7,13
  141:17 144:10
factor 4:4 18:25
  63:1
factors 18:19,20,23
  19:5
facts 33:25 35:13,14
  35:19 36:19
  103:25
fades 91:1,12
fail 17:1
failed 17:4
fails 20:11
failure 20:23 27:13
  144:25
fair 24:7 29:24
  134:10 141:16
  149:3
fairly 9:8 30:23
  105:3 119:13
  124:4
fairly-easy-to-pre...
  123:5
fairness 32:24
fall 56:9,13 71:13
falls 37:8 56:14
  102:4 142:6
far 8:12 15:14 24:18
  70:25 127:20
  128:15 129:15
  130:25
Farber 3:20 6:10,10
  110:3,3,24
fashion 105:21
  106:25 119:10
  120:21
fathomable 58:6
fault 10:14,19,24
  80:16,19 116:7
  123:23 130:11
faults 116:20
feasible 36:23
fed 45:7
Federal 1:2 2:2
  17:12 20:8
feed 73:15 117:15
feedback 86:11
feel 122:10

fell 8:8
felt 97:25 98:1
FERC 3:1 36:8
  107:13,15,20
  108:2 121:20
  133:21 135:1
  144:23 150:17
Feuerstein 3:2 5:12
  5:12
few-hundred-tho...
  80:9
fewer 23:5
fighting 116:16
figure 31:11 91:25
  93:5 125:1 127:16
figures 47:10
filed 16:23 17:1
  55:12 60:12 64:21
  95:23
filing 14:22 36:2
filings 42:15
final 101:1
Finally 19:20 21:24
  32:14
find 10:20 79:17
  110:10 119:7
  120:20 147:20
finding 17:14 64:18
  64:24
fine 26:15,24 130:7
finishing 149:20
firm 47:8,9
firm-withdrawal
  28:21
first 2:3 11:3 16:5
  17:17 18:17 20:25
  21:10 30:16 38:11
  46:17 47:2 60:24
  63:16 66:19,20,20
  66:21 74:2 77:16
  78:6,23 79:8 96:4
  96:5 98:21 99:20
  100:17 106:3
  112:21 141:2
first-order 130:24
Fisher 3:19 6:18,18
  22:12,12 98:20
  124:23 144:5
fit 35:13 116:4
fits 99:5
five 44:12 72:15
  79:21 80:11 88:13
  138:7
five-mile 44:22
fix 21:12 113:16
  137:14

fixed 90:6
fixing 19:14 74:12
flag 26:8
flow 4:15 7:12 9:3
  14:2 18:21,22,24
  19:15,19 20:16
  21:13,16 22:20,21
  31:4 38:14,14,22
  38:25 39:3,5,13
  39:16 41:20 44:17
  44:19 49:1 52:1
  56:16,21 65:24
  75:11 89:22,23
  91:18 106:9,11,14
  115:23 116:22
  117:24,25 135:3,6
  136:9,10
flow-based 16:17
  18:19 35:12 48:24
  56:18,23 61:14,15
  67:23 75:8 92:9
  115:18 121:14
  141:4
flow-driven 39:7
flowing 63:19,22
  71:20,21 79:14
  106:6 128:9
flows 9:9 10:2,5
  11:2,6 16:12,15
  17:20 18:9 19:2,4
  19:9,9,13 21:6
  30:6 49:2 65:19
  65:21 66:13,13,16
  66:17 67:4 70:20
  71:4 76:11,13,18
  76:20 77:2,4,4
  78:10,17 84:3,5,6
  91:8 126:24 128:5
  129:16 134:3
  142:20 147:25
focus 46:19,23 63:8
  63:25 65:6 99:21
  150:12
focused 13:10 14:22
focusing 68:13
folks 57:21 86:17
  114:5 127:17
follow 35:23 38:4
  81:8 86:22 107:15
  110:21 131:20,22
  143:3 147:3
follow-up 62:5
  71:25 74:1 76:9
  78:1 131:15,18,23
  145:24
followed 5:10

following 23:14
  24:24 38:3 104:5
followup 69:19 87:2
  87:6
footprint 146:9,10
  146:11,18
forced 28:20 32:21
  93:22
forces 30:9
foreground 47:15
foremost 17:17
  30:16
forever 61:23
form 32:2 40:7 95:1
formula 24:10,11
  24:11,14,22,23,25
  25:4,18 26:1 27:4
  99:3,9 144:15,21
  144:25
formulas 24:4 98:21
  103:20
formulation 25:20
  31:3,7
forth 12:10
forward 10:20
  15:24 33:1 37:25
  50:18 54:7 60:5
  106:16 120:23
Foster 3:11 5:25,25
found 40:7
four 66:9 79:20
  139:22
framework 54:25
Frank 3:16 6:24
  69:9 99:18 104:4
  104:18 107:4
  124:6
fraught 14:12
free 30:19 100:6,16
Freedom 44:2,3,4
front 42:22 86:19
  86:20 126:6
  140:14
frozen 50:4,7
FTWR's 49:14
  51:22
fulfill 23:17
fully 26:25 148:10
function 54:5 70:19
  70:21 71:2,3,4
  105:12 122:25
  123:25 137:8
functions 32:21
further 37:25 60:6
  69:7 71:13 94:2
  122:24 143:20

16:24 17:2,20,20
20:16,17 54:16,25
56:21,24 59:7
77:16 78:7,25
87:16,21 92:7,11
111:8,10,18
114:14 115:10,15
119:1,5 132:5,11
139:9 148:5,7
identifies 17:17 57:2
74:21 89:4
identify 16:21 18:10
18:11 20:15 60:23
61:2 78:9,24
79:18 88:12 90:14
93:17 115:6 143:8
148:12
identifying 10:9
61:17 66:12 92:14
105:16 143:10
148:9
ignore 35:10
iis 119:20
imagine 143:14,15
immediate 131:6,7
impact 10:17,19
87:21 94:4 105:20
124:2 131:6,8
143:13,15,19,21
impacted 55:21
94:1,13
impacts 10:14 84:1
105:16,21 122:12
impending 32:11
implement 22:8
120:7
implicated 23:7
implications 129:23
144:1
important 20:3 27:8
27:21 47:10,22
48:23 54:17,20
65:16 66:23
107:12 125:9
133:9 138:5,8
140:17,18 144:16
importantly 32:14
impose 110:7,14
imposed 32:13 58:3
imposition 28:11
30:14
impossible 52:23
77:18
improve 44:25
116:18 125:13
improved 120:20

inability 88:4
inappropriate 51:4
incentives 26:7
incidental 16:19
31:9 125:12 127:2
127:5 141:19
incidentally 125:19
include 41:7 69:22
95:3 150:8
included 29:9 58:22
142:8,17,24
includes 27:20
including 40:16
55:10 119:12
120:1 145:10
incorporated 29:12
incorrect 16:22 18:2
increase 48:10,13
59:25 109:20
110:16 120:13
increased 22:20
32:11 81:13 103:9
105:10
increased-capacity
45:25
increases 45:23
increasing 80:19
120:11
incremental 81:17
84:16 100:1,11
103:2 134:5,22
incrementally 99:22
independent 102:9
indeterminate
110:17
indicate 69:21
indicated 26:14
97:9 131:24
133:25 147:6
150:4
indicating 70:2
indication 24:13
indicator 115:1,23
138:9
individual 8:12
18:21 20:6 34:16
64:13 139:25
individuals 64:10
industry-accepted
13:21
inert 110:9
inertia 116:19
inevitable 57:17
information 27:11
32:18 36:7,11
43:7

informed 12:2
21:14
infrastructure 9:7
21:18,20 30:22
40:20 69:23,24
92:13,21 120:16
131:7,8 134:1
147:5
initial 10:3 63:23
77:23 91:12
135:22 136:9
137:24 138:12
initially 8:22 93:7
117:6 135:9
initiates 130:8
injection 32:1
innocent 149:5
Innovations 6:3
instability 39:11
117:24
instant 66:20
integrated 14:1
15:9
intended 8:9 16:9
16:15,19 17:18,19
17:21 18:9,11
19:4,14,16,21
20:15,15,17,20
21:12,17,21 24:12
66:14 67:14 89:14
89:15,16 149:11
interaction 130:1
interconnect 23:1
72:23
interconnected 84:4
128:1
interconnecting
21:2 47:22
interconnection 1:5
1:10,16,20,22,24
8:5 9:13 21:1
23:10 29:11 48:14
49:8,13 50:3,6,13
85:7 87:11,22
103:3,5 112:4
118:16,18
interconnections
43:3,4 79:8
interconnects 81:13
interest 13:22
interested 121:23
interesting 21:15
65:17 80:4
interface 78:10
115:23
interfaces 39:19,19

interfere 5:5
interregional 30:12
82:21,22
interrupt 4:7 73:11
123:23
introduce 6:9
introduced 10:16
introduction 55:2
introductions 5:9
5:11
inure 34:8 102:19
invalid 24:23
invested 83:3
investment 53:2
101:19
inviting 142:5
involve 80:13
involving 33:18
irrational 21:6
island 12:15 16:14
19:20 22:4 28:5
33:9,13 34:21,25
35:6,12,18 37:18
37:24 39:22 40:8
40:12 42:18,19,21
43:21,22,25 44:10
44:11,17,20 45:23
55:23,24 56:6,14
57:4,9,15,16,19
59:21 60:4 68:25
69:3 88:10 91:2
93:21 101:15,21
102:3,14,16
103:16 104:7
109:6 110:12
116:10 117:14
118:25 124:10,14
136:22,24 145:12
145:13
ISO 48:11,20,21
82:19,19 83:18
isolate 64:13 73:13
isolated 116:22
isolation 13:13 14:1
14:8
issue 9:10,25 10:1
10:10 17:25 22:1
35:7 39:11,16
40:11 64:17 67:4
70:16 72:5 76:16
76:20 81:18 82:21
93:4 97:1,5,22,25
100:17 102:6
108:11 110:6
116:21 117:6
126:17,18,18,19

126:20,22 127:7
138:14,21 141:16
141:18 149:7
issues 7:16 9:3,4,11
22:6 28:9 33:16
34:19,20 35:20
38:22,24,24 39:4
39:18,21,25,25
40:3,18,18,20
41:18 54:16,25
55:25 57:8 69:24
72:2 74:6,9,12
78:2 81:23 92:7
92:12,19,23 96:11
97:10 101:7 102:1
102:17,22 103:6
104:12 108:18
111:13 115:25
116:11 121:25
122:3,3,17 123:24
134:2,9 141:18
145:8,16
items 146:7

─────── **J** ───────

January 2:5 150:18
Jason 3:2 5:12
Jeff 3:23 6:16 46:12
54:10 65:10 98:4
jeopardize 15:13
jeopardy 140:14
Jersey 12:15 15:1
24:17 27:24 28:15
28:21 29:2,25
55:24 56:1 57:7
57:22,22 83:2,9
137:2 143:24
Jersey's 35:10
job 60:2 61:16
jobs 90:10
JOHANNING 3:5
John 3:20 6:10 33:3
34:10 110:1,3,20
joined 50:17
Jones 3:12 6:6,6
judgment 41:23
judicial 36:24
July 35:21
justice 35:14
justifiable 18:10
justification 77:24
justified 24:6 94:24
justify 30:14 58:2

─────── **K** ───────

KA 73:4,10,11 78:3

129:17 130:12
Kaan 3:25
Kd 98:14
Keatley 3:4 5:14
Keeney 43:22 44:8
keep 7:17 62:24
63:10 89:5 139:1
145:18
Kevin 3:12 6:6
Keynes 144:6
Khadir 3:22 6:23
6:23 38:6,7 45:13
69:15 72:1 85:3
108:8 145:4
kind 10:12 11:5
12:4 79:7 80:2
91:23 95:17 116:2
118:10 122:1
123:5,6 129:10
134:13,17,21
147:14 148:18
kinds 134:19
141:20
KM's 81:14
knew 49:21
know 25:5 38:3 65:2
77:16 78:2 82:12
87:1 88:18 92:6
93:12 94:17 96:5
96:20 112:19
113:5 120:2,17,19
123:19 126:19,21
128:5 138:6 143:5
knowing 24:22
109:23 133:1
known 33:13 37:3
kV 39:19,24 43:2,2
43:4,8,9,10,10
44:16 45:8 47:19
47:21,22,25 49:15
57:6,8 72:4,19
73:14 79:3 124:17

———————
L
———————
L.L.C 1:5,10,16,18
1:20,22,24
Laios 3:16 7:1,1
62:23,23 64:18
83:23 99:19,19
127:13,13 141:25
141:25 146:4
large 14:13 15:9
88:5 92:8 105:11
129:4
largely 91:17,20,21
136:15 138:3

larger 9:2 27:16
127:25
lastly 13:5
law 24:7
laws 71:19
lead 14:12 18:19
24:24 40:6
leave 86:5
leaves 59:13
LeCOMTE 3:8 4:3
5:22,22 6:8 7:3
11:11 16:1 22:10
33:2 38:2 45:11
46:7 54:10 60:7
60:19 64:7 65:8
66:3 68:9 69:5,13
69:17 70:7 71:24
74:19 76:1 78:20
80:4 81:6 83:20
85:1 86:1,9 88:25
89:11 90:13 91:8
92:5 93:9 94:17
95:19 96:8 97:7
98:3,17 99:17
101:9 104:3,17
105:18 107:3
108:6 109:25
110:20 111:1,25
112:7 113:8 114:3
114:9 115:9,13
116:4 117:22
118:11 119:4,21
124:5,21 125:23
126:8 127:10
129:6 131:13,18
131:23 132:15,18
132:22 133:5,18
140:13 141:23
143:1 144:3 145:2
145:22 147:1,18
148:3 149:13,18
led 34:16 77:24 88:3
left 12:8 120:19
legal 35:25 124:24
legally 24:23
leisure 38:10
length 43:23 56:22
lengthy 33:18
lesser 8:25
let's 43:23 49:4 67:7
90:8 96:2 131:14
letter 35:21
letters 34:14
level 47:19,23 98:14
126:13,14 143:16
143:21

liability 95:1
lieu 37:10 121:12
life 65:2 148:2,15
life/aging 133:25
lift 41:23
light 22:13 74:24
likelihood 93:21
131:9
limit 25:16 28:7
45:24 80:23
109:21
limitations 84:24
limited 36:18 57:16
limiting 76:11
Linden 1:18 3:19
6:18 16:13 22:12
22:15 23:1,2,5,10
23:12,12,25 24:20
25:22 27:22,23
28:3,8 29:5,17
30:5,6 31:6,12,22
31:23 49:1 72:16
72:21 73:16
113:22
line 9:19,19,22
10:24 11:3,6
18:22 19:1,2 21:5
39:1 43:5,11
44:12,16,17,22,23
44:25 45:1,4,5,22
47:13,18,24 48:6
48:12 49:16,23
51:18 52:13 57:6
57:8,14,18,20,20
58:2 63:20 64:4
65:22 67:17 69:7
70:19,20,21 71:3
71:3,4,22 73:1,24
76:16,18 77:6,19
77:20 78:9 79:3,4
79:6,7 86:17 91:6
95:1 97:2,4,4,24
102:25,25 104:25
105:1,7,13 106:7
106:13,19,20
108:23 109:1,19
115:19,22 116:18
117:2,4,9,12,13
117:14,16 123:11
123:18 124:17
125:19 126:2
127:3,4,8 135:5,6
135:19 136:11,23
136:25 137:1,2,4
137:18,22,23
139:23 142:4

147:8,8,10,11,12
147:23 148:11,15
148:19,19,20,25
lines 29:16 43:2,2,9
43:10 56:21 66:13
73:13,15 79:9
88:18 108:23
113:17 122:1
126:25 127:1
130:4,14,16,16
134:16
link 64:23
linked 65:1
Linwood 44:9
Lion 43:24 44:7
45:4
list 7:25
listed 69:25,25
77:12 120:13
listen 86:14,17
listened 149:22
listening 86:15
literally 28:2 80:15
130:13
litigate 15:12
litigation 14:12
26:21 62:19
little 18:13 42:18
43:6 44:20 45:14
46:20 52:4 60:14
78:16 80:3 82:1,8
82:9 85:5 87:2
88:14 89:1 90:19
98:5,8,15 99:8
102:6 107:7
121:24 124:8
141:13 143:17
149:8
lives 143:25
LMP 37:3 101:16
101:16 102:18
105:16,21 121:7
LMP's 94:11 95:14
LMP-based 35:3
LMP-related
102:19 103:14
load 18:21,23,25
19:2 22:23 23:4
23:17 24:25 25:17
26:19 28:24 29:4
29:14,22 30:21,24
31:20,24 32:2
43:7,15,18 44:21
45:6 50:20,21
52:7 54:4 56:5
57:12 63:19 68:3

68:3,5 70:3,20
71:4,16 73:6
75:15,15,15,16,17
75:17,21,21,23
76:25 83:1 85:13
85:22 102:13,14
107:18 114:22,23
117:24 118:4
122:22 125:15,16
127:24 128:3,15
129:1 131:10
135:15,16,18
137:7,12,12,15
143:23,25 147:25
148:21
load-serving 26:1
loads 31:4 44:21
113:18,19 128:19
148:1,21
local 13:7 22:22
23:3,17 24:18
26:19 27:17 39:11
41:8 74:25 75:1,1
75:6,6,14 114:22
122:22 123:1
130:6,17,18,23
143:23 146:19,21
localized 39:14
130:22
locally 27:21
located 28:24
location 77:4 88:10
88:19,20 143:22
locational 128:14
logical 56:19
long 15:8 20:6 31:7
64:25 77:10 121:3
122:20 138:9
144:7 149:23
long-established
32:23
long-term 54:21
longer 52:11 60:15
91:3 99:16 136:3
137:22 138:8
longstanding 55:25
look 10:9 15:17,24
18:16 33:1 37:21
37:25 39:15 40:7
42:22 43:3,23
44:1 45:1 48:19
50:15 53:15 54:7
60:5 63:5,18
70:17 72:9,17
77:12,17 83:1
88:18 91:2,15

92:5 93:20 94:6
97:3,3 101:22
102:18 104:12,24
106:2 109:18
115:16 116:1
118:4 119:10,16
119:17 121:8,12
123:16 127:16
128:17,21 129:2
132:10 143:18,19
145:7,10 147:4
149:10,11
looked 13:13 14:7
102:1,12 121:10
looking 34:18 53:25
57:4 58:21 77:9
78:12 82:15 84:16
94:20 95:15
101:18,20 106:21
109:18 128:7
130:24 132:11
142:19
looks 82:12 103:13
116:22 147:10
lose 97:16 116:9
losers 15:12,12
62:12
losing 84:11
lost 29:1 96:5
lot 39:9 44:5,22
60:25 69:20 72:22
80:3 83:23 85:8
88:6,6,11,16
90:17 132:8
137:19 138:22
145:14,15,15
147:21
lots 62:18 90:8
128:10
low 43:9
lower 126:14
LS 33:20
LSE 25:20 26:6,8
28:17 30:20
LSE's 26:12,22 27:4
29:6 31:2,7,16
LSEs 25:16
lunch 83:22 86:2,4
86:8 99:23

M

M 105:15
mailboxes 52:8
main 31:6 73:20
maintain 31:2 72:11
73:6 85:12 134:14

maintained 31:25
maintaining 32:7
85:14
major 26:22 43:3
majored 58:10
majority 8:18 55:15
111:6,6 112:1
136:7
making 15:22 41:23
74:13
managing 46:14
manifest 114:18
manifested 115:18
manner 82:22 96:17
map 42:22 128:8
Mark 3:24 6:21
54:11,12 60:7
68:11
market 5:15,24
23:19 30:5,8,9
34:5 45:14 93:15
93:16,20 94:3,24
95:11,17 99:2
101:14 104:22,23
105:4,14,23 106:2
106:18 108:9
109:6,9,14,15
143:23
Martin 3:9 5:23,23
134:25,25 137:16
138:16 139:5,8,14
Maryland 1:13 6:13
6:15 33:6,8 35:22
121:5
Maryland/Delaw...
36:17
matching 68:25
material 132:6
matrix 17:5 54:23
54:24 56:12 58:16
58:23 59:4 64:15
69:25 77:9 92:6
92:15 114:4,10,12
115:11 119:24
147:4
matter 1:4 2:8
17:22 81:12,25
122:6 138:4
matters 18:3
Matyas 3:13 6:4,4
Mayer 3:18 6:19
22:10 23:16 28:23
46:18 69:19 76:9
77:7 81:7 83:20
85:17 96:4,5 97:8
113:9 125:24

126:8 127:10
133:6 137:11
147:19 148:3
Maynard 144:5
McGLYNN 3:15
mean 48:19 64:25
106:20 125:18
126:4 144:7,9
meaning 27:15
131:10
means 17:16,22
19:1 24:8,11
27:14 31:10,16
45:20 53:1 70:6
105:16 137:14
144:25
meant 122:17
126:12
measurable 147:14
measure 12:22
13:17 14:24 15:21
21:6 42:3 63:22
77:1 78:1 84:5,7
90:7,12,23 93:6
100:5 103:1 117:4
125:1 147:11,16
measured 19:15,19
22:20 78:3
measurement 12:6
78:14 84:15
measures 15:16
18:20 99:13,14,16
128:6 142:20
measuring 12:21
14:23,25 66:13
76:24 77:4 91:24
125:7 137:17
mechanism 54:21
80:7 89:3 106:11
112:10 143:8
148:7
meet 32:23
megawatt 47:4
52:19,20 53:17
72:12 73:21 78:17
82:25 85:14
megawatts 28:25
31:25 33:11 43:8
43:25 44:13,14
45:6,10 47:8
49:14 53:10,18,18
63:18,19 72:13
78:6,13 124:17
128:9 135:7
member 46:14
members 55:4

mention 85:5
mentioned 17:6
45:15 51:15 56:2
57:6 61:4 66:21
67:16,17 68:22
70:10 78:20 85:20
132:4 139:20
145:6 147:23
mentioned/told
83:24
merchant 13:1,4
46:20 48:2,17
50:19 52:23 53:7
107:8,23 125:4
127:20
merchants 107:8,17
merely 27:3
merits 145:24 147:2
message 20:1
met 107:24
method 4:5,13,18
7:9,14 12:12
13:20 15:20 16:8
17:10,17 18:18
20:14 37:15,21
49:7,25 50:1 52:2
55:10 95:12
113:21
methodologies
12:20 15:15 59:18
103:18 147:6
methodology 11:22
11:25 13:16,20
14:2,3,6,10 15:6,7
26:13,23 37:4
38:13 42:13 46:4
54:6 56:7 59:13
59:15,18 68:21
91:24 115:10
methods 55:12
metric 78:1,19
100:5,20
mic 86:20 99:18
101:11 104:20
110:1 124:22
127:11 143:3
mic's 140:13
Michael 6:7
microcosm 12:5
microphone 5:5
86:18 89:12
middle 143:4
miles 43:24 44:3,4
44:13
million 28:16 33:23
49:12 52:17,17

56:2 72:3 79:25
80:10,11 95:2,6
98:13 101:17,21
109:10,11,12
mind 62:25 63:10
76:11 129:25
146:4
minimis 25:14
31:11 53:9,16
143:16,21
minor 87:17
minority 29:1
minus 45:3,3
minute 149:7
minutes 7:5 85:2
mischaracterize
117:23
mismatch 34:8 35:7
35:11
missed 129:14
mistake 21:11 24:21
mitigated 14:16
mixed 53:16
mixing 82:23
mobilize 52:23
model 48:24 56:18
56:22,24 104:25
models 56:16 68:18
modest 80:25
modified 24:2
modify 12:24
moment 67:21
69:17 82:14
money 132:9 138:23
monitoring 4:25
months 49:17 82:13
Moon 5:16
morning 5:20 6:10
11:18 12:1 33:4
38:6 46:12,16
61:5 66:18
mortal 144:8
mounting 15:8
move 10:20 50:18
107:6 110:22
116:14 120:23
moved 68:21
moves 29:17 125:19
moving 8:23 89:5
106:16 140:9
MTF 28:14 29:4,9
29:13,21 30:13
31:8,13,15 32:3,6
49:8 52:5
MTF's 29:3,20,23
MTFs 31:20

multiple 14:14 41:1
  64:1 139:10
multiplied 18:23
multitude 62:6
multivalued 98:23
muster 25:21
mute 4:7 7:5 11:13
  11:15 86:14

_____ N _____
name 5:2 38:7
narrow 37:13
nature 8:9 10:4
  38:19 39:3 52:22
  59:5 66:14,22
  70:1 75:7 92:23
  112:25 115:6,24
  116:6,18 118:3,14
  123:21 130:7
  141:6 149:10
near 23:1 55:3
nearby 71:12
necessarily 10:4
  19:24 28:23 41:11
  56:25 129:1
  132:19
necessary 21:8,15
  122:1 132:14
necessitate 142:3
need 14:15 15:3
  22:20 27:9 30:17
  37:14 39:12 50:8
  50:9 51:25 56:23
  57:1,13 63:18,23
  67:19,21 69:1
  72:25 73:5 84:1
  98:22 100:24
  104:21 107:10,10
  107:17,21 108:3
  109:18 111:17,23
  122:24 123:18
  127:8 137:13,14
  140:2 141:21
  144:24 146:23
  147:24 150:9
needed 23:18 31:22
  133:8,12,16
  147:12
needing 105:9 146:5
needs 80:1 112:18
  114:1 120:20
  135:15 144:16
  146:20
neither 35:14 66:11
Neptune 3:23 6:16
  46:14 47:4,8

50:21 51:14 65:11
NERC 45:3 95:7
  114:19 118:19
  146:9
nesting 25:14
net 132:9
netting 25:14 31:13
  53:15
network 85:24
neutral 12:11 37:12
  102:10
never 67:13 97:21
  114:20 118:22
  134:12,23 138:23
new 1:8 10:18 12:15
  14:25 24:17 27:20
  27:24 28:15,21
  29:2,25 30:7 35:9
  39:25 40:1,2 44:2
  44:3,4,22 47:6,6,7
  47:13,21 48:11,20
  48:21,22 51:16
  54:17 55:23 56:1
  57:7,18,19,22,22
  58:2,10 63:3,5,20
  63:21 68:15 71:17
  71:20 72:15 73:13
  73:15,21,22 76:10
  76:13 79:3 81:22
  81:23 82:3,7,11
  82:19,20 83:1,2,2
  83:6,7,9,9,9,10,13
  83:18 85:10,15,18
  85:19 91:19 98:13
  104:24 105:7
  106:7,8 117:12
  118:18 119:1
  135:3,19 136:8,11
  136:14 137:2,4
  143:24 147:10
Newark 27:21
  137:2 149:2,5
nightmare 140:2
nine 132:11
non-beneficiaries
  31:19
non-discriminatory
  38:13 42:5
non-factor 63:9,24
non-flow 59:11 74:6
  74:9,11 75:9
  76:15 141:3,4
  149:11
non-flow-based
  16:9,10
non-flow-related

69:22
non-overload 16:11
  16:12,18 17:11,16
  17:23,24 18:6,11
  18:18 19:3,22
  20:14
non-power 38:14,19
  38:25 39:3,13
nonsensical 27:15
normally 70:10
  72:1
north 43:1,10 44:9
  106:12
Northeast 2:3
northern 24:17
  29:25 42:14 43:20
  73:7,14 85:7,13
note 4:23 7:6 18:14
  22:6 46:8 47:22
  69:5 95:19
noted 4:10 35:21
  61:1,22 63:10
  64:20 84:16
  142:12
notice 2:9 7:24
  42:24 82:23
noticeable 124:2
noticeably 137:4
notices 4:10
noting 5:9
notion 86:24 87:10
November 4:9
  49:16 55:1 58:4
nuclear 33:11,12
  44:13 72:4 88:6
  108:17
nuke 105:6,9
nukes 105:8,12,20
number 8:7,13,16
  9:2 10:13 21:22
  37:16 41:8 42:12
  52:16,17 55:18
  66:11 79:10 80:15
  82:13 85:4 91:23
  111:17 120:11,13
  132:4,9 136:17
  140:16,17 141:8
number-one 81:20
numbers 8:10 47:3
  105:2,3
numerous 42:15
NYISO 30:3

_____ O _____
OATT 28:1,13
objection 31:6

objective 12:6,11
  13:17 27:15 37:7
  37:11 102:9 104:1
objectively 14:23
obligations 23:18
obscure 18:3
observation 83:23
  142:2,21
observations 127:15
  127:19
observe 80:22
observed 105:11
obviated 111:17
  132:9
obvious 19:17 28:1
  124:24 134:12
obviously 78:18
  81:20 89:18
  104:11 106:14
  114:25 120:18
  127:15 146:5
occur 35:15 37:24
  100:1 120:25
occurred 113:6
  124:2
occurring 62:22
ODEC 3:24 54:14
  54:22 55:2,5,7,9
  55:11,13,21 56:4
  56:5 58:6,23
  59:17 68:12
OEMR 5:21 6:4,6
offer 13:24 42:16
  50:2
office 5:13,14,16,18
  5:23 6:1,2,4,15
  33:8
offload 26:3 67:19
  67:22,24,25
offloaded 68:4
offloads 75:21
offset 23:13
OGC 5:22 6:7
Oh 139:7
okay 10:3 11:17
  45:13 60:19 66:21
  67:22 70:9 72:1
  75:4 86:9,22
  88:15,25 89:17
  90:6,7,10 91:1
  92:12 93:5,19
  94:11 95:19 97:8
  98:4 105:22,25
  110:24 119:21
  122:19 123:3
  131:13,18 132:15

137:5,12 138:24
  138:25 140:13
  149:19
old 6:21 36:17
  43:13,15 45:7
  50:9 54:13 68:14
Olympic 44:5
once 29:12 45:19
  62:25 72:6 97:23
  114:24 139:9
  141:9 142:4,9
  147:9,13
one-time 84:11,15
  100:10 101:2
one-year 101:18
ones 91:18 92:24
  120:1
ongoing 29:13
online 78:17 86:6
open 22:14 32:10
  86:6 130:14
  142:23
opening 7:6 68:22
  75:20 76:15 97:11
  149:9
opens 64:19
operate 71:14
operating 33:12,13
  33:17 94:23
  103:20 105:24
  108:20 109:2
  115:5
operation 29:20
  31:14 114:6,12
operational 9:1,3,4
  40:9 49:16 59:3,5
  59:6,7,10 92:19
  114:15,17,21,23
  115:4,4,14,25
  116:5,12,16,21
  117:23
operations 32:9
  129:23
opinion 13:23 61:25
  107:15,16 125:3,4
  125:9
opinions 12:9
opportunity 46:16
  54:15
opposed 65:7
  117:24
opposite 12:14 74:9
optimization 30:3
option 102:23 103:7
  103:13
options 30:13 34:12

62:21 102:12
orange 43:1
Orchard 44:2,3,4
order 4:10,24 7:18
12:19 25:10 36:8
41:21 42:6 52:17
55:1 58:4 85:12
101:17 107:15,20
108:2,4 146:16
original 67:25
116:18 134:3,22
138:5
originally 60:13
os 93:22
outage 45:3,5
108:25
outcome 36:23
103:25 121:16
outlets 118:6
output 59:25 103:9
108:22 116:14
outside 8:1 14:3
25:17 42:25 142:6
outward 118:10,14
outweighed 24:21
over-arching 16:4
over-dutied 16:25
70:11 71:1,1,6
123:22
over-duties 9:20
over-duty 79:16,18
81:1
overall 27:9
overload 67:23 68:3
75:11,14,17,18,22
75:25 91:15
116:23 117:1
overloading 130:16
overloads 78:18
96:18 116:1 138:2
140:22
overly 41:11
overran 83:10
overrun 82:3
overwhelmed 19:12
overwhelming
37:16 55:15
owner 28:12 55:8,9
62:24 72:5 113:18
113:23 146:1
owners 3:17 6:25
7:2 11:17,20,20
13:24 14:21 15:3
32:5 34:16 36:3
60:25 69:10 82:24
87:3 99:20 107:8

107:14,25 110:18
122:8 124:7
127:14 134:14
142:1 146:6

_____

P

P 53:20
p.m 150:19
page 47:2,3,3,14
48:2 50:15 52:5
53:3
pages 49:4,8
paid 21:1 28:23
98:11 113:19
panelist 5:11
panelists 6:8 60:8
86:16 149:21
papers 86:13
paradigm 35:13
parallel 136:12
Park 72:14
part 9:8,18 19:6,10
57:15 75:8 79:6,7
81:19 82:17 84:3
106:10 117:20
127:24 132:7
136:6
partially 11:7
participate 30:5,7
32:25
participated 34:13
55:9
participation
149:25
particular 9:17
10:11 36:8 46:1
49:10 57:5 63:15
78:7 88:9,23
101:25 103:22
111:14 112:23
116:7 119:6
122:15,20 128:7
129:1,2 132:3,12
146:12,19,24,25
147:23 149:21
particularly 51:10
58:20 121:25
parties 11:23 12:16
12:20,23,25 13:3
13:5 14:4,5 15:1
16:20 17:25 20:3
25:23 26:4 28:17
28:19 29:23 30:17
30:19 32:4,19,21
35:8,15 36:4
38:18 41:3 42:8

66:17 67:6 93:18
99:22,24 100:2,11
100:12 104:15
106:6 134:9
135:24
parts 134:16
party 21:2 30:18
32:8
party's 13:23
pass 25:21 57:16
124:22 127:11
129:16
passes 140:14 143:3
patently 110:14
paths 65:20
PAUL 3:15
pay 13:24 29:9
49:18 51:4 62:16
62:20 65:1 70:15
110:15,17 113:22
114:1
payer 29:22
payers' 24:13
paying 14:5 29:23
57:21,23 82:6
100:15 124:12
126:1,4,15
payments 30:9
pays 27:7 70:16
126:23,24
PCNG 85:25
peak 32:3 48:24
49:1,3
peak-load 31:13
peninsula 45:18
117:15 128:13
136:25 149:1
penny 113:20
people 51:11 57:22
61:22 66:24 72:10
86:12 89:20 90:4
90:18 91:17 95:20
95:22 97:13,13
125:20 136:10,13
141:15 144:16,22
149:3,22
People's 6:15 33:8
perceived 15:4
percent 19:1,2
25:13 26:14,20
33:23,25 34:7,9
34:10,24 43:14
49:18 50:20,20,21
52:7 53:9,19,21
56:1,4,13 102:15
102:18 106:12,12

110:12,16 113:22
121:3 125:16
126:3,12,14
133:15 136:15
109:12 136:16
percentages 51:2
perception 13:22
perceptions 12:8
perfect 15:21
perfectly 92:17
perform 32:20
35:17 105:1,5,24
112:13,16,20
performance 9:1
40:9 59:3,6,10
92:19 114:15
115:4,25 116:21
performed 12:6
31:23 42:9 49:12
93:16 109:6
period 18:5 33:19
77:14 81:3 93:24
103:7 114:25
138:6,7,10
periods 15:8 48:24
49:1
permit 23:16 26:1
person 5:1 89:10
125:18
perspectives 95:25
pertained 42:20
Pete 5:21
Peter 3:7 96:20
phenomenon 83:24
118:10 128:2
PHI 33:20
Philadelphia 137:1
149:1
phone 4:7 86:5,6,11
phones 5:7 7:5
11:15 46:8
photograph 47:16
physical 20:23,23
131:6,8 143:22
physically 47:5
physics 71:20 128:5
142:20
pick 56:5 95:9
picking 128:19
129:1
Pico 94:7
picture 129:5 137:5
pie 138:12
piece 14:8,8 17:4
19:17 99:1,2,4

141:13
pieces 98:22
pigeon-hole 40:24
pigeon-holed 39:14
pipes 85:25
PJM 1:5,10,16,20
1:22,24 3:15,16
4:12 6:20,25 7:1,8
7:24 8:4 11:17,19
11:20,22 14:2
15:5,15 16:21,22
16:23 17:4,8 21:2
21:13 22:8,14
24:1 26:12,12
27:10,12 28:8,22
29:6,16,18,19
30:2,8,9 32:14,20
33:14,19 34:4,5
34:12,14,15 35:4
35:9,17,19,20,23
35:25 36:2,3,6,10
37:2,3 39:5 41:5
43:20 45:18 47:6
47:6,7,12 48:10
48:22 49:13 50:4
50:16,17,24 51:1
52:9,16,18 54:18
54:22,22,24 55:6
55:7,8,10,15,22
56:11,15,21,24
57:10,19 58:15,16
58:16,18,19,23
59:4,7 60:1,24
61:8,15 62:23
64:15 65:24 66:7
66:18 68:12,17
69:8,25,25 70:10
73:4 77:8,10
81:21 82:12,20,20
86:24 90:11 94:17
95:10 98:21 99:19
101:14 103:14,20
103:23 105:14
107:13 108:10
109:4 119:23
120:14 124:12,13
124:15 127:13
128:11 129:14
133:22 136:17
141:25 146:6,9,10
146:16,17,18
PJM's 4:3 27:1 35:2
36:13 37:21 44:21
53:24 56:3 58:20
place 4:7 5:3 7:4
10:14 11:4 64:11

66:19 68:2 88:12
100:2,3 104:25
105:1 106:23
121:8
placed 63:17 136:2
placing 142:20
plan 4:16 23:9 26:8
86:3,4,7
planned 7:12 23:16
planning 25:24 28:8
28:10 30:12 56:15
56:16 58:9,14,15
58:18,19 81:21
114:18,19 115:2,3
115:5 146:11
plans 29:20
plant 93:18 94:2,5,7
118:5,7,9,25
119:13
plants 116:8
pleadings 36:16
please 4:7,23 5:1,3,6
7:4,17 8:2 16:2
38:8,10,18 40:5
40:25 41:4 42:4
42:12 43:19 64:11
85:2 86:14 99:18
110:2 113:9
124:22 127:12
pleased 22:15
plus 28:25
pocket 116:22
point 7:17 10:11,21
11:9 15:1 20:3
23:10 50:2,22
53:24 64:3,7
79:18,22 84:21
85:16 91:11 96:1
96:3 98:18 106:17
128:14 134:6
137:20
pointed 28:23 87:10
137:11
pointing 93:25
points 20:25 43:4
108:9
policy 5:25 6:3
23:20 27:6 99:1
pop 79:11
portfolio 128:23
portion 19:6 22:23
23:11 32:7 33:25
47:25 56:6
position 18:6 20:8
52:25 90:12 92:16
104:15 110:21

129:17
positions 111:2
possible 77:13
107:2 119:24
120:5 122:5
130:23
possibly 51:24 53:1
129:22 133:2
144:21
post-conference
150:5
post-Sandy 21:23
post-technical 7:21
posted 46:10
potential 45:20
59:21 61:4 62:7
109:24 148:9
potentially 24:12
51:16 105:10
122:23
power 17:12 20:8
22:14,20,21 29:6
29:15,18,19,21,25
31:3 32:15 33:20
38:14 39:5,6,15
41:20 46:13,13
48:21 56:16,21
71:10,18 85:13
116:8 123:2
125:19
powerful 24:19
practical 17:22
practically 83:4
practice 27:19
pre-technical
133:24
precedent 36:1
precludes 103:10
preconference
36:14,15 60:10,12
predicated 66:12
67:3
predict 120:10
premise 105:8
prepared 114:23
present 5:10 103:6
presentation 8:5
16:2 38:4 46:9,10
61:5 145:6
presentations 60:9
132:7
presented 34:14
PRESENTERS
3:14
presumably 26:23
presumed 24:20

pretty 10:25 95:13
102:3 116:24
120:19 130:9
prevailing 27:1
prevent 109:22
previous 26:23 40:3
previously 42:7
46:18 74:2 118:12
136:2
price 29:18 30:10
48:9,10,21 52:18
117:16
primary 42:21 43:4
57:5 59:24 106:14
111:12 127:5
139:11 141:20,20
principle 30:12
principles 12:7,17
13:22
prior 107:22
priority 21:23
probability 105:9
probably 91:3
98:14 112:13
117:7 126:2
129:19
problem 8:9,14 9:19
9:23 10:3,4,9,12
11:7,7 12:18 13:6
16:25 17:3 21:3
23:3,7 40:11,12
40:13,14,14 41:6
49:2,20 51:8,12
51:13,15,17,19
52:1,3 58:7 59:5,8
59:20,21 60:3
61:17 62:7,14,20
65:13,15,18 67:13
67:15 70:1,4 72:2
72:7,17 74:15
75:6,7,8 78:11,12
78:16 79:24 80:6
85:7 87:5,9,15,20
88:14,14 89:16
90:4,15,16,25
91:5,12,14,16,20
92:3,23 93:6,20
93:22 94:9,9,16
97:23,24 98:1,9
98:12 100:15
105:14 111:11,21
112:25 113:4,6
115:2,19,24 116:7
116:19 117:2,5,7
117:11,18 118:23
119:4,5,8,14

121:14 122:7,7,9
122:9,22 123:10
123:15,16,21
124:4,9,14 129:13
130:2,5,8,15
132:3 135:25
136:1,5,9,13,21
136:21,23 137:3,6
137:8,22 138:5,8
138:13,23 141:6
141:14 143:13,20
148:22 149:4,10
problematic 61:22
63:25
problems 8:17,19
8:22 9:6,15 14:12
24:24 39:2,8 41:6
42:6 55:22 57:15
59:7 62:7,21
64:20 89:2 98:11
112:12 114:17
116:1 117:1 118:1
118:23 119:1,7
121:2,2 123:4
129:19,22 130:10
130:18 132:14
138:3 139:10,22
140:3,6 148:8
procedure 114:21
114:22
procedures 30:3
146:11
proceeding 35:9
proceedings 20:4
145:25 146:3
process 14:6 21:1
22:15 28:8 29:11
32:17,19 33:17
34:12 37:11,11
56:18,24 58:15,20
87:22 97:20
118:19
produce 24:7,23
25:8,11 35:14
55:14 103:1
produced 55:18
56:9
producers 29:15
producing 24:14
product 65:23
productive 54:7
progress 15:13
project 9:22 12:16
14:8,9,15,19,19
15:2,3,5,5,10
16:21,24 17:2,21

19:7,16,16,20
20:6,10,18,20
21:8,12,15,18,22
22:4,19 23:11,14
23:15,18,24 24:17
26:9,11 27:5,11
27:12,14,16,20,23
27:25 28:15 31:5
32:17 33:15,21,25
34:8,9,10,22,25
35:6,12,25 37:8
37:10 39:16,17,18
40:7,9,14,15,19
40:19,21,22,25
41:7,8,17 42:14
42:18,19,21 44:11
44:11 45:8 47:1
53:20 56:7,19
57:3,4,5 58:8,10
58:10,18 59:12,24
61:11,24,25 62:2
62:11,11,16,17,25
63:3,12,13 64:1
65:1,2,3,4,21
66:14,15 67:8
68:19 77:16,17,24
79:6 83:8,14
90:10 93:5 95:10
95:16 100:13,15
101:14,17,21,25
102:5,8 103:17,22
104:14,24 111:13
111:14,16,20,22
114:11 121:16
124:12,19 125:16
127:7 128:7,8,16
132:10 133:8,12
133:13,16 135:11
139:9,21 142:5,7
144:12 145:19
148:14 149:12
project's 18:12
projects 4:12,14,19
7:8,10,15 8:8,11
8:13,16,18 9:2
10:16 12:13,22
13:10,13,19 14:11
14:14,20 15:9
16:6,8,11,11,12
16:14,18 17:7,11
17:16,23 18:6,11
18:18 19:3,22
20:7,14,19 21:18
22:3,22 23:23
25:17 26:16,18
27:2,10,17 28:6

28:22 30:19,25
31:4 33:20 36:19
36:21,23 37:5,16
37:18 38:15 39:5
40:17 41:2 46:4,5
46:15 47:11 52:6
52:24 53:7 55:16
55:18,21,23,24
56:8,10,12,18,23
58:5,12,17,22,25
61:8,21 63:7,14
66:10 68:23,24
69:2,3,22 73:5
76:10 77:13 79:10
79:13,21 80:15
82:1,2,4,6,8,9,13
83:13 85:4,11
94:21,24 98:24
100:18,19,20,21
100:22,23,24
111:18,24 114:13
120:12,12,13,16
120:18 121:25
122:2,4,13,16
127:21 128:10,13
128:19,22,24
129:3 132:4,9,11
136:7,16 138:22
141:3,5 142:3
143:7
projects' 17:18
promoting 54:20
propagating 131:9
proper 15:6
proportion 59:22
proposal 18:14 22:7
35:2 109:5 146:2
proposals 33:18
34:14
proposed 23:22
27:11 33:24 34:1
34:25 35:18 68:16
68:16
proposing 12:25
13:3 68:20 103:16
proposition 91:23
propositions 13:9
13:11
prospective 18:10
protecting 71:10
protest 26:21
protested 22:17
protocol 28:10
provide 4:24 12:2
16:10 32:1,12
36:6 38:20 39:2

42:5 45:8 58:13
60:1 109:20
117:16 132:17
135:18
provided 8:7 32:18
58:19 64:15 77:9
92:8 113:7 114:5
114:10,11 133:23
provides 24:18
25:23 31:8 54:24
134:19
providing 36:11
64:2 137:24
provision 25:15
95:3
provisions 31:17
35:24 94:18,22,25
proxies 22:21 23:24
41:21,22
proxy 25:6,19
prudency 31:1
PS 72:12 73:7 85:7
PSE&G 33:20 89:9
108:15
PSEG 3:22 6:23
32:2 38:7,10,11
42:12 44:4 47:17
47:18 52:6 53:20
72:6,7,15 85:11
85:12 102:16,19
public 1:12,13 6:13
6:13,14 23:19
29:2 33:6,6,7 34:3
99:1
pull 111:20
purchased 47:12
pure 135:14
purpose 16:20 17:7
17:21 18:12 19:7
20:17 30:20 66:15
66:22 67:14 71:22
76:22,22 77:1
84:5 97:2 125:13
126:20,22 127:7
137:23 148:20
149:11
purposes 78:8 99:10
134:4
pursuant 2:8
pursue 115:8
pursued 116:17
purview 120:7
pushed 99:22
pushes 84:17
put 10:14 12:10,19
12:23,24 13:2,4,6

14:24 28:7 60:13
63:23 67:16 71:20
75:9 89:22,23
94:14 100:1,3
107:23 108:16
127:3 139:25
148:25 149:1
puts 52:24 90:1
putting 63:21
126:21 128:5

_____

Q

quantifiable 102:9
quantify 18:21
103:15
quantifying 102:10
quarter 33:22
question 10:15 11:4
17:9 18:17 20:2
27:6,7,18 37:20
38:11 40:8 58:3
59:14 60:23,24
62:3,13 65:12,14
66:11,19 69:19
70:5 71:8,23 74:1
74:8,11,18 75:9
76:2 96:25 100:19
106:1 107:13
119:23 121:4,21
124:8,23,24
126:16 127:21
129:7,10 133:22
134:2,11,12,20
138:11 139:8
140:12 141:2,9,12
142:9 144:24
145:23 146:7
147:3,24 148:13
148:23 149:14
questioned 36:5
questioning 36:13
questions 7:19,24
11:10 16:5 27:25
33:1 37:17,25
53:4,8 60:6,11,20
60:22 64:8,9,10
65:12 66:6 69:6
75:10 77:8 96:16
96:24 110:23
113:11,13 131:19
131:25 140:17,18
149:23 150:8,11
150:12
queue 78:25
quick 83:21,23 86:4
121:21 133:22

quickly 63:8,24
64:3 82:18 85:17
quite 40:17 95:19
96:5 107:9 136:20
149:23
quote 36:10 144:5
quote-unquote
36:12,12

_____

R

radial 118:2
raise 53:4
raised 58:3 134:10
134:24
raises 102:17,21
ran 49:21 101:14
RANDY 3:5
range 128:24
ranges 52:16
rare 96:11,12,12,13
96:16,17,19,24
97:15,21
rate 26:9 29:21 36:2
ratepayer 23:17
26:10
ratepayers 27:24
rates 29:16
ratio 50:20 52:7
102:13,14
rational 12:12
16:14 18:8 19:3
66:15
rationale 53:14
136:6
ratios 101:19
re-create 77:20
reaches 123:15
reaching 80:23
reactive 39:2,4,16
78:6 92:17 115:21
116:13 121:2
133:3 138:3
read 38:9 111:1
150:12
readily 9:9 41:2
58:17 90:23 91:11
147:11,14
reads 23:25
ready 24:1 83:11,21
real 109:13 148:13
real-time 114:6,12
realistically 112:13
realize 35:5 138:22
realized 93:24 94:3
reallocate 31:18
reallocation 112:19

really 8:23 9:10,12
11:4 63:18,20
65:22 66:18 77:20
80:12 81:15 84:22
85:17 87:25 88:8
92:22 97:1 107:12
112:25 117:9
121:1 122:4,7,25
125:21 130:7
131:3 134:12
137:7 138:10,11
138:11,14 144:12
144:25 149:24
reason 10:22 11:3
32:5 38:23 51:25
52:1 62:1 77:5
99:6 112:17,20
129:14 137:11
147:7
reasonable 4:14,17
7:10,13 17:10,13
20:9,12 22:18
28:14,18 31:14
38:12 50:22 55:14
56:9 58:6,13,24
59:15 61:10 77:3
106:25
reasonableness
32:19
reasonably 54:18
55:19 134:10
139:1
reasoning 14:18
reasons 14:14 63:12
64:20,21 111:19
132:12 140:7
rebuild 19:16
147:12
recall 30:17
receive 28:20 30:8
103:4
received 23:12 24:9
27:25
receives 30:18
receiving 17:24
recess 60:18 131:17
recognize 7:15 36:4
36:18 84:2 127:23
144:11
recognized 35:22
recognizes 35:17,21
recognizing 48:12
recollection 87:15
Reconfigurations
88:21
record 4:25 34:17

34:18 38:16 98:8
recoup 48:8 52:18
recover 48:4,5
  52:20
recovered 19:18
recovery 21:17 32:4
red 43:1,5,23 44:7
  45:4
redirect 10:24
redo 140:7
redress 144:23
reduce 31:11 48:9
  108:21 109:2
  123:4
reduced 95:14
reduces 143:21
refer 16:10
reference 17:21
  20:17
referred 23:16 25:5
  29:1 94:10
referring 105:3
  125:18 126:3
reflected 84:25
  105:20
reflects 108:4
refuelling 108:25
regard 35:24 36:13
regarded 108:11
regarding 42:17
  100:17 108:9
  128:4 135:2 145:5
regardless 15:2
  23:6
regards 139:8
region 20:24
regional 27:16
  28:10 39:10,17,20
  39:20 58:19
regionally 40:4
regions 29:19 30:11
regroup 150:7
regular 66:1 119:5
regulations 5:15,24
  43:16
regulator 21:22
regulators 30:25
Regulatory 1:2 2:2
reinforce 50:9
reinventing 37:6
reiterating 60:2
reject 20:7
relate 78:17
related 4:15 7:11
  8:18 9:3 10:4,5
  25:14 75:18 76:20

78:10 79:2 92:20
  92:21 101:16
  104:7 105:4
  116:21 118:12
  131:25 133:1
  138:13
relates 97:10
relationship 16:15
  18:8 19:4 56:25
  66:16 95:8 137:8
  143:24
relative 19:1 22:21
  59:22 61:1 125:7
release 27:12
relevant 24:7
reliability 4:12,15
  5:13,19 7:8,11
  12:13,21 13:19
  14:11,13 16:5
  23:19 40:10,15,16
  40:22 44:24 56:11
  56:15,20 57:11
  58:9,17,22 61:8
  69:24 70:4 73:6
  74:4 78:2 85:12
  90:1,9 92:10,11
  94:21 95:7 99:4
  100:19,20,23,24
  102:10 106:3
  111:4,8,13 128:22
  143:7 146:10
reliability-driven
  102:8
reliable 90:5 136:1
relied 58:13 59:17
relief 16:25 17:24
  67:7,8 71:15
  114:22
relies 16:12 18:19
relieved 67:20
relinquish 28:20
relitigating 125:3
rely 58:24 70:23
  148:16
remain 25:1
remaining 9:7
  11:10
remains 21:15
remarks 76:15
  97:11 149:9
remember 86:21
  105:2 114:20
  124:11
remind 7:4 29:3
  95:22
remove 41:14

removed 20:22
removing 106:20
repair 21:4 23:14
  31:22 124:1
repairs 21:23 74:16
repeatable 12:6
  13:16 41:12
repeated 106:25
  114:16
repeating 46:19
repetitive 115:6
  150:14,14
replace 50:9 70:14
  134:13,15,17,18
  148:17,17
replaced 80:2
  112:18
replacement 9:21
  9:24 79:5
replacing 81:4
  112:14 147:8
Reporter 3:25
Reporters 3:25
represent 4:21 8:16
  10:2 134:9 144:10
representative 11:2
  11:7,8 12:4 13:12
represented 9:9
representing 5:3
  11:19 146:5
reproduced 140:23
request 34:4 48:14
  50:14 52:10
requested 12:11
  119:2
require 23:23,25
  28:9 41:20,22
required 28:11 42:5
  49:18 57:10 58:25
  80:12 113:1 132:6
requirement 52:15
  110:8,15 146:17
requirements 23:20
  146:8
requires 17:12,13
  28:13 32:16 37:3
  118:20
rerouting 22:24
resistance 65:20
resolution 90:24
resolve 8:10 16:9
  23:2 49:14 55:25
  57:8,10 59:2
  94:16 98:12 115:1
  119:14 132:13
  139:9

resolved 9:15,16,23
  21:1 23:8 26:25
  57:14 87:11,17
  96:13,14 118:24
  122:7 139:22
resolves 56:19
resolving 8:17
  36:11 54:19
  117:18
resources 28:25
respect 18:16 20:2
  27:11 30:2 35:25
  37:24 101:6
  107:21 122:2
  123:8
respond 68:12
  95:21 104:19
  110:5 126:10
response 37:19 66:6
  68:8 69:10 125:2
  131:24 146:6
responsibilities 36:2
responsibility 11:21
  27:3 28:17 32:15
  53:19,21 101:24
  110:12
responsible 24:12
  31:12 32:6 47:24
  48:15 50:6,24
  61:24 82:6
rest 54:8 118:6
  128:11
restricted 130:13
result 9:20 14:4
  16:17 19:9,11,24
  20:22 25:11 28:18
  32:11 51:20 57:25
  59:23 76:10 79:4
  79:16 102:15
resulted 26:22
resulting 25:4 26:9
  29:8
results 15:17 24:7
  24:14,23 25:12
  28:15 31:4 32:20
  32:22 41:11 56:9
  109:3,8,15,16
  113:15 142:7
rethinking 31:17
retire 41:15
retired 91:5 123:4
  137:21
retirement 43:15
return 101:19
return-on-invest...
  101:23

returned 136:1
revealed 34:7
revenue 32:4 52:15
revenues 144:14
reverse 49:2 102:17
  102:20
revert 12:17 13:13
  61:21
review 31:5 32:20
  115:4,8
reviewed 109:8
reviews 40:7
revise 31:7
revision 23:21
  26:22
revisit 101:5
Richardson 3:16
  6:24,24 11:18
  61:12 62:10 69:9
  69:9 107:6 124:6
  124:6 126:6
Richmond 55:3
riddled 14:18
riders 30:19
ridership 100:6,16
right 20:5,9,10 49:7
  62:10 67:20 69:16
  74:14 75:13 81:12
  90:17 94:7,17
  96:18 98:7 124:9
  131:13 132:22
  142:9 143:25
right-hand 52:5
rights 28:21 32:1
  47:9,10
Ringhausen 3:24
  6:21,21 54:12,13
  68:11,11
risk 43:15 90:2
  136:3,4
river 33:10
road 63:21 65:17,19
  66:1,1,1,2 67:17
  67:19,19,22,24,24
  67:25,25 68:1
  76:19,19,22,23,24
ROBERT 3:20
Rock 43:22 45:6
Rolashevich 3:7
  5:20,21 60:21
  62:4 64:6 74:1
  76:8 77:7,25
  119:22 120:3,9
  121:4,18
rolled 8:10
Ron 3:8 5:22 60:21

75:4 113:10
119:22 133:7
148:10
ron.lecomte@FE...
8:3
room 2:1 5:6 101:11
149:22
Roseland 139:23
rotational 116:19
rough 35:14
roughly 17:15 20:13
21:4 24:8,14 25:9
25:11 89:10,14,15
89:16 98:13 104:2
110:8,15
RPM 45:18 95:15
117:16
RTEP 9:15 10:17
11:22 22:16,22
23:13 27:19 28:8
32:13,19 33:14,17
36:19,20 39:5
41:17 47:11 50:1
50:8,10,24 52:22
55:16,18,21,23
56:8,12,17,23
58:8,17,24 87:17
87:23 118:22
120:8,14 121:3
128:10,19,22,24
129:3 138:12
rule 13:8 25:7,14,22
28:9 37:14 53:9
97:17
rules 13:1 25:13,25
31:16 36:9 37:8
37:14 49:23 79:25
80:10 99:15
107:11 113:6
ruling 36:8
run 45:22 47:7
48:22,24 51:21
68:17 144:7
running 47:5 105:8
106:2 108:19
116:12

_____

S

safety 123:24
sale 48:6
Salem 109:20
137:21
Sandow 45:4
Sandy 17:3 19:17
23:15 120:18
Sasson 3:18 6:19,19

16:3 66:5 70:5,8
74:6 75:4 76:7,14
81:8 96:7,10
97:11 113:10
125:25 126:11
133:7 140:11,16
147:20 148:10
149:16
sat 143:4 149:22
satisfied 95:11
save 53:2 69:11
95:1
savings 25:13,21
31:8 35:3 99:15
saw 46:3 83:7
116:12
saying 62:6,8 64:12
64:15 96:21 121:6
121:8,9 140:22
149:19,20
says 41:24 45:3
70:10,13 80:10
82:21 97:17
107:16,20
SBD 33:25 35:13,14
35:19 36:19
103:25
SBDFAX 37:10,14
SBDFAX-based
37:1
scenario 53:23
109:24
scenarios 108:12,12
schedule 7:21 14:2
22:14 23:21,25
24:2 25:10 26:7
26:12 31:17,19
32:20,22 34:6
35:19 37:2,22
98:21 99:13
103:19,19 131:14
150:5
scheduled 150:18
scheduling 30:4
scope 7:20
scrutiny 36:24
season 32:10
second 17:9 20:2
21:2 37:20 45:5
53:23 62:3 65:4
79:8 81:19 102:6
secondary 111:22
Section 28:13 34:6
37:22
see 8:12,17 28:4
32:8 39:16 43:21

44:4 53:5 55:17
63:22 72:11,17
74:19,20 75:10
80:16 83:2 84:6
87:5,7 88:7 94:11
106:19 120:16,17
120:23 123:17
131:19 145:8
150:7
seek 48:13 53:1
seen 108:16
sees 71:2 128:12
seldom 33:10
selected 139:9
selection 27:5,14,23
32:17 41:22
self 13:22
sell 48:11
selling 108:13,17
send 8:2
sense 25:20 47:1,15
74:7,7,14 77:1
111:15 112:7
116:3 122:5
124:20 140:24
147:15 148:21
sent 27:12
separate 114:10
separated 45:18
separately 107:20
separating 27:6
separation 117:16
series 27:17 98:22
seriously 24:16
serve 31:11 85:21
135:19 137:12,15
148:21
served 22:6 43:8
135:15
serves 18:2
service 1:12,14 6:13
6:14 30:21 32:13
33:6,6 34:3 62:25
65:4 108:24
serviced 21:13
serving 23:17 24:25
55:4 68:3 75:15
75:16,16 113:19
137:23
session 7:22
set 100:21 102:22
106:5 128:22
129:3 150:4
settled 33:19
seven 26:18 58:22
severe 124:3 130:20

Sewaren 17:2,3
19:15,16 21:18,22
23:15 40:19
share 29:24 50:20
52:7 102:13,14
125:5,15,17
shareholders 52:24
SHAWN 3:3
shed 114:23
sheets 8:12
shield 71:5
shift 51:6,6 65:21
110:11
shifted 23:12
short 9:13,14,22,25
10:10,12 17:1
19:7,8,10,12,14
20:19,21,25 21:3
21:6,12 22:22
23:3,7 30:22
38:22,24 39:7,8
39:10,11,24 40:3
40:17,18,20 41:18
41:24 51:10,13,18
51:19,22,25 52:3
59:1 60:18 63:11
67:7,8,9,23 68:5
69:23,24 70:9,12
70:15,22 71:2,5,9
72:1,7,9,10,17
73:3,9,17 74:12
74:23 77:2 78:4
78:21,24 80:6
81:13 82:18 83:5
83:9,14,17,24
84:8 85:4,6,8,17
85:22 86:25 87:13
88:7,9,16,19,20
88:22 90:16 91:22
92:12,24 93:13,15
94:10 96:12 98:6
98:8,11,20 99:21
99:22 100:14
104:9,12 111:5,10
111:11,12,21
112:1 113:4,11
121:25 122:2,15
122:16 123:8,12
123:21 126:17
129:13,19 130:11
130:25 131:1,5,17
132:3,20 133:9,16
136:20 138:4
141:7 142:13
143:16,19 144:2
145:8,8,19,20

146:15,23
short-circuit 47:1
shortcomings 22:13
show 49:22 106:5,8
143:15
showed 72:25
101:15
showing 35:3
shown 44:24 47:18
48:25 53:10,11
121:15
shows 43:20 52:12
56:12 109:9
shuffling 86:12
side 6:8 52:5
sides 12:14
signed 72:13
significant 23:11
24:18,19 32:7
56:5 58:1 59:8
80:14,25 117:17
124:4 130:9
significantly 25:22
91:9 122:23
signify 58:1
silence 5:6
similar 25:23 30:23
47:23 63:17 87:13
101:3 115:20
136:8
Similarly 21:17
simple 139:1
simplify 24:5
simply 16:7 29:15
57:18 99:9 134:13
144:14
simulations 78:14
single 10:11,21
15:10 41:1 64:17
79:19 97:4 112:17
117:9 128:3
137:19
single-load 127:23
127:24
singled 38:21
singling 14:9
singular 13:10
sit 124:25
sitting 144:10
situation 11:6 63:15
64:25 87:24 88:3
93:2 97:13 99:25
100:1,6 113:7
120:24 123:6,17
128:25 146:12
situations 53:15

33:12 43:11
120:11
subjective 14:18
submitted 11:23
12:4 60:10
submitting 54:23
subsequent 4:10
subset 12:13
substantial 80:19
124:18 130:5
substation 9:18
21:23 23:14 27:21
47:17,18 98:14
113:17 130:14
substations 10:15
22:25,25 23:4,6
79:5 113:17,19
sudden 82:9
sufficiently 35:12
suggest 35:10 51:21
65:14 106:24
121:11 129:12
suggested 38:19
suggesting 135:22
suggestion 28:6
suggests 29:11
suited 41:17
summarized 18:15
summer 83:18
summing 82:2
super 19:17 74:13
74:13
superior 38:12 41:5
supply 65:21
support 11:24 38:16
55:11 69:21 150:2
supported 20:24
92:9
suppose 87:7
112:13 143:18
supposed 89:8
sure 11:14 54:6
74:8,11,13 81:9
86:18 87:13 93:12
93:14,19 96:1,5
104:17 106:5
111:16 112:14
127:9 133:1,8
135:13 139:7
140:18 141:15
148:3 150:12
surface 124:19
surprising 128:7,9
surrogate 78:9
115:22
surrogates 41:21

survive 36:24
suspect 111:11
suspend 110:7
Susquehanna-Ro...
139:21
swallow 37:14
swing 116:9 130:3
swings 78:15
synchronism
116:10
system 19:10,17
26:11 29:8,21,24
39:24 40:10 42:23
43:7 44:6 50:4,11
50:17 63:2,5,18
64:4 65:4,6,7,18
65:22 71:10,12,18
72:4 73:14 77:19
81:16 85:20 90:5
97:4,15 104:25
105:6,7 106:16,22
116:8,9 118:7,9
118:20,22 119:3
122:9,10,11,25
123:2 125:14
128:11 129:14,20
129:21 130:7,9
131:2 136:1,2,3
137:10 140:8
systems 21:24

_____
T
_____
table 5:4 8:7,14
77:23 80:17 118:2
tag 5:4
take 11:10 13:8
18:16 26:4 39:15
40:7 42:22 43:3
43:23 44:1 45:4
52:13 53:13 60:15
61:20 66:2 68:7
70:9 72:9,17
80:15 88:6,11
93:3 101:22
108:23,25 123:2
127:19 128:18
129:8 131:14
144:18 145:7,10
146:5
taken 14:6 24:15
60:18 80:3 86:8
88:12 103:10,12
104:11,14 131:17
takes 27:2 70:19
Takis 3:16 7:1
11:18 62:23 99:18

99:19 127:11,13
141:24,25 143:1
145:23
Takis' 106:17
tale 146:1
talk 10:8 11:1 45:13
45:17 48:23 49:9
52:4 68:6 98:6
111:4,15 143:14
talked 25:15 88:21
89:20 99:23 111:5
talking 38:9 87:19
92:25 100:18
122:14 135:9,11
138:21 142:14
146:8,8,12,15,15
146:19
tariff 14:2 29:16
35:20,23 37:2,22
49:18,20 70:13
94:18,23 103:21
TEAC 109:7,8
132:6
technical 2:7 4:19
4:20,23 7:16
11:24 17:5 18:8
36:6 54:23 150:17
teeny 79:13
Teeter 3:10 6:2,2
121:19,19 122:16
133:20,20
telephone 5:1
telephones 86:14
tell 51:12 52:21
83:7 94:19 97:9
104:7 112:14
113:5 119:6 146:3
tells 108:4 137:19
ten 7:5
terminate 57:20
terms 32:16 34:17
53:25 62:1 65:18
78:12 84:8 110:6
119:24,25 121:6
134:1 144:9
territory 21:13
test 20:12 61:18,18
61:20 118:20,21
143:14,15
Tests 38:15
thank 4:5 7:3 11:16
15:25 16:3 22:8
22:10 32:25 33:2
33:4 37:25 38:6
46:6 54:8,12,14
60:5,8 61:12 65:8

66:3,5 68:9,11
69:4,5,18 71:24
73:25 75:4 76:8
77:7,25 85:25
86:1,5 101:12
107:6 108:8 110:3
121:18 122:18
125:25 127:13
131:12 141:23
145:21
thanks 4:8 8:3,5
11:11 16:1 38:2,5
45:12 46:7,11
54:10 60:7,17,21
64:6 81:6 83:20
85:1 86:7 98:3
99:17 101:9 107:3
108:6 109:25
113:8 114:3
119:22 124:5,21
125:23 126:10
127:10 129:6
131:15 132:15,22
133:5,18 143:1
144:3 145:2,22
147:18 149:18
150:2,15,16
theme 74:25 76:2,6
theoretically 64:13
theory 87:8
thermal 8:18 9:19
34:23 39:13 40:18
40:23 56:20 57:10
63:11 67:23 78:5
78:9,18 91:15
92:9,17 95:7
116:1,23 117:1
121:2 133:2 138:2
140:22 145:10,19
146:23 147:13
thermal- 56:11
thermal-based
121:14
thermally 92:20
thing 45:17 48:17
50:8 51:12 52:21
63:10 69:14 73:1
82:18 83:7 101:1
109:17 113:2
129:14 145:18
149:8
things 17:13 42:24
47:1 51:11 72:11
72:25 73:9 81:9
81:21 85:3 86:10
88:1 90:7,18

107:24 115:6
117:12 118:8
130:19,22 133:17
think 11:4,9 13:23
34:18 37:21 48:23
49:5 53:6 54:2,2,3
60:1 61:4,7,10,12
61:15 62:1,4 64:9
65:15 66:7,8,21
68:15 69:1 75:4
81:21 82:12,14,20
84:1 86:24 87:1
89:2 90:13,17
92:13,17,21 93:9
93:13 94:19 95:24
96:4,11 97:5,5,9
102:2 104:8,15,21
106:17 107:2,12
107:16 108:2
110:14 111:6
112:2 120:6,6,10
120:12,15,22,24
122:14 124:11,24
125:9 126:25
131:24 133:9,10
136:9 137:10
140:22 141:4,20
141:21 142:12
143:9,17 144:1,14
144:24 148:6,13
148:23 149:7,8,19
150:1,6,9,15
thinking 46:24
75:10 98:23
third 142:16,24
thorough 104:12
thought 26:24
62:24 102:7
129:11 132:18
thoughts 149:16
thousand 72:11,13
73:21 82:25 85:14
three 33:11 72:8
73:14 79:20 88:5
105:8 108:24
threshold 20:3
thresholds 112:5
throw 127:18
throwing 136:17
tie 43:21,22,23
44:15 88:21
tied 45:9
ties 42:25 43:20
44:8,8
time 8:23 10:2,5,13
10:24 11:10 13:18

14:16 15:8 21:11
25:4 26:24 27:23
33:19 38:8 41:23
42:11 45:16 49:3
50:3,17,23 54:9
64:4 68:7 71:14
72:6 77:14,17
79:11 80:3,5,20
81:17,25 84:13
86:2,4,18 88:7,11
90:20,22 91:1,12
92:2 93:8,24
98:12 101:5,20
103:6 105:2,11
106:21 108:15,21
109:1 110:9,18,25
112:21 119:9
121:3,9 122:9
123:3,17 124:1
134:11,14,20
135:7 137:16,18
138:1,6,7,10
140:24 144:17,17
144:19,21 147:21
150:9
timely 32:18
times 5:10 15:18,18
53:22 61:5 114:25
timing 27:9
tiny 79:13
titled 49:8
TO's 35:9 66:7,18
68:12
TOAAC 34:15
today 10:8 12:2,10
16:23 34:11,17
40:8 41:13 43:16
54:15 60:23 61:1
63:11 69:7 94:23
95:16,24 102:2,21
105:6 106:7 110:6
119:19 139:10
142:12,18 145:7
147:20 149:25
150:13,16
token 128:10
told 25:3
toll 66:1,2
tomorrow 41:14
tool 19:23
top 84:18 99:23
topic 60:6
total 18:22 28:16
33:21,22,23 34:1
34:7,9,24 101:13
101:16 117:19

totally 109:3
touch 150:6
touched 62:5
touchstone 104:1
track 77:10,14
traditional 29:14
31:20 93:20
104:23 105:14,23
106:18
traffic 63:22 67:20
transaction 30:4
transfers 30:2
transcribed 4:24
transfer 45:24
135:17
transfers 30:2
transformer 29:6,7
29:12 44:16 96:15
125:21
transformers
134:16
transmission 3:17
3:23 4:16 6:17,25
7:2,12 11:17,19
11:20 13:2,4,24
14:21 15:3,17
16:8 17:18,23
19:1 20:20 21:5
21:19,25 22:2,5
22:14 23:23 25:6
26:8 28:10,12,12
29:5 31:21 32:1,5
32:7 34:16 36:3
37:5 39:10 40:1,2
40:2,3 43:8,11,12
44:12 46:14,20,23
47:9,9 48:3,18
49:10,16 52:15,24
53:8 54:18 55:2,7
55:8,8 57:6,16,18
58:20 60:25 61:2
62:24 67:17 69:10
70:19,20,21 71:17
71:19 72:5 76:10
76:16,18 79:2,9
81:21 82:24 85:14
87:2 88:18 96:13
96:15 97:22,23
99:19 104:24
107:8,14,23,25
108:22,23 109:21
110:16,18 115:7
116:17 118:8,19
119:11,16 122:1,8
122:25 123:2,11
123:18 124:7
125:4,6 127:14

131:6 134:14,16
135:3,4,17 137:10
141:10,25 146:1,6
146:19 148:11
transmission-dep...
55:6
transmissions 39:9
39:25
transparent 58:15
transport 47:21
traveling 135:3,4,7
treat 107:20 116:23
134:21
treated 61:14
107:10,17,21
108:1 134:4
treating 38:20
treats 128:24 129:4
tremendous 73:3
77:22 106:4
trending 123:17
trickier 91:23
143:11
tried 148:6
trigger 123:20
trip 116:9 130:4,4
tripping 130:17
trips 130:6
trivialized 24:16
true 19:15 99:14
144:8
try 28:7 51:7 53:1
62:14 77:20 78:17
80:13 86:20 88:12
96:2,16 106:18
113:13 124:25
144:20
trying 8:16 74:17
76:1,21 86:13
89:5 96:1 110:21
117:3 127:16
134:8 135:5
144:15 146:24
Tuesday 2:5
turn 49:8 50:15
82:10 86:10 114:4
turned 87:21 105:7
105:10
turning 47:3,14
87:23 105:21
turns 83:3,12
113:18,20,21
twice 45:18
two 8:15 16:4 18:25
19:2 20:24 37:17
39:23 43:4,8,9

44:7,8,16 45:8
49:4,17 52:8,25
65:11 66:5 68:13
72:16,25 73:13,15
79:5 85:2,3 86:10
87:16 93:15 96:16
98:20 99:20 102:1
109:1 114:9
118:23 127:9,15
127:18 135:13,19
141:19 142:14,22
142:25 144:18
two-load 116:22
type 29:5 53:7
84:25 104:8
115:22
types 8:21 13:18
23:23 37:5 66:10
69:2 74:4,24
77:10 104:10
115:13 127:9
131:25 139:2
typical 21:3
typically 78:8 92:20
136:12 147:8,9
typing 86:12

_____
U
_____

ultimate 61:23
104:1
ultimately 15:1
33:19 116:17
unavailable 21:10
uncomfortable
129:12
uncontested 34:20
34:21,23 35:2
undefinable 37:8
undeniably 28:18
underline 77:19
underlined 38:15
underlying 30:20
42:15 59:5
underneath 139:12
underscores 21:5
understand 7:24
49:24 53:14,22
67:2 74:11,22
86:17 87:8 96:2
107:12 108:3
110:20 111:1,7
115:9 118:13
125:10 127:9
135:5 148:4
understanding 76:3
89:6 95:25 134:7

understands 22:16
understood 71:22
undocumented
24:19
unduly 19:25
unfair 15:4 110:14
110:24
unfortunately 80:24
unique 13:3 14:20
87:24 90:15
100:22 116:25
120:24 142:22,24
146:20,22
unit 105:17 108:25
units 91:4 93:21
97:15,15,24 98:1
105:22 108:13,15
108:17,21,22,24
109:1 116:11,14
137:21
universe 61:3
144:11 148:9
unjust 19:24 59:2
unmanageable 41:7
41:9
unqualified 20:10
unrealistic 108:12
109:3
unreasonable 19:25
28:11 59:3
unreliable 45:7
unstable 116:15,20
130:3 137:14
unsupported 13:23
unwilling 25:1
unwind 106:22
unwinding 80:14
updatable 101:3,8
update 84:12
updated 63:4
103:24
updates 37:1
upgrade 25:6,7 27:8
29:13 44:20 47:23
47:25 49:12 50:6
51:23 57:1 59:7
59:24 70:13 103:4
125:13
upgrades 9:17 26:3
26:4 28:22 30:23
32:9,11 48:15
50:8 59:10 125:6
usage 65:18
usage-based 65:6
use 10:6 14:23,25
15:16 19:5,23

25:6 29:21 32:12
41:20 53:10,11
55:10 58:10 61:1
61:20 63:3 65:5
66:24 68:21 73:10
74:4,22 84:12
89:4,9,14,18,20
92:1 93:8 94:15
99:13,14,16 100:5
100:20 109:14,15
112:24 114:16
115:3 117:4,8,20
121:16 125:13
135:14,19 136:5
136:13 137:5,15
137:18 144:20
145:16,17,19,20
147:11,14,15
useful 54:24 91:7
user 28:12 29:14
user's 84:23
users 26:11 63:5
67:12,12,13 68:4
84:18,22 90:21
127:1,2,4,4 136:7
136:14,18,21
137:4 140:25
141:17 148:12
uses 65:3 73:22
91:16 140:4
141:19
usually 20:25 72:4
79:24
utilities 23:9 26:2
36:18 51:4
utility 20:8 22:23
23:3 29:2,11 55:6
utilized 57:24

V

Val 3:10 133:19
Valerie 3:9 5:23 6:2
121:19 133:20
134:25 140:16
148:23
Valerie's 140:11
valid 24:2 35:22
36:12
value 24:21 25:24
45:23 77:21
124:20
varied 65:5
variety 40:16
various 8:8 90:7
95:15 114:23
134:9 141:6

vast 8:17 111:6
136:7
vendor 50:24
venture 87:25
versus 38:14 106:9
VFT 1:18 3:19 6:18
22:12,15 23:1,2,5
23:10,12,12,25
24:20 25:22 27:22
27:23 28:3,8
29:17 30:5,6 31:6
31:12,23 49:1
VFT's 29:5 31:22
view 12:3 27:1 30:1
36:24 37:13 62:17
64:3 123:14
128:14 134:17,20
146:13
views 4:21
violates 24:10
violation 16:9 34:23
39:17 41:13,15,16
56:20,22 59:9
63:7,16 64:3,17
68:15 70:1 73:24
77:15 78:6 81:10
81:11,18,24,24
82:7,10,11 84:24
84:25 90:1,2 95:7
97:12,17 100:4,12
114:19 115:3,20
123:20 133:2,3
136:11 141:10,11
147:13,22,24
violation-backed
64:19
violation-based
18:5 41:10 42:1,7
65:7 66:8 68:21
84:10 89:25 101:4
101:7 113:3
135:23 140:20
violations 4:15 7:11
8:19 14:14,16
18:7 19:8 22:23
38:20,20 39:1,3,6
39:7,13,14 40:16
40:23 41:8,9,12
41:19 42:1 56:11
56:24 57:11,13
58:25 59:1 62:22
64:2,23 77:11
78:5,6,21 104:9
104:10 132:1,13
132:19,20,22
139:25

violations-based
18:1 41:6 51:6
Virginia 55:3,4
virtually 77:18
visited 85:21
visualize 143:12
vocal 29:1
voltage 8:19 9:4
34:23 38:24 39:2
39:4,13,15,16,17
39:18,20 40:12
41:18 56:20,24
57:11 63:11 78:7
78:11 92:21
115:20 116:1
117:1 126:13,14
145:17 146:23
voltage-based 56:11
115:19
voltage-type 92:10
voltages 88:5
116:13 145:13
volume 86:11
voluntary 82:22
vs- 1:9,15,19

W

wait 5:5 108:24
149:6
Wake 72:14,20
want 12:16,20,24
38:4 46:19 53:4
54:14 55:17 60:5
60:8 63:25 68:7
69:16 83:20 85:16
86:10 87:5,7
95:22 96:10 98:6
98:7 108:8 110:22
111:15 113:12
122:10 123:16
125:2 126:9
127:18,19 129:11
140:18 143:3
147:1 148:3
149:19 150:7,8
wanted 7:22 45:13
47:14 49:9 74:10
80:12 82:17 84:7
85:3,5 86:22
106:19 125:8
126:16 131:19,19
131:21
wanting 93:3
warrant 38:16
Washington 2:4
waste 15:2

water 71:20,21
way 18:10 23:25
24:10 29:21 45:1
48:5 50:5 51:14
51:19 55:1 61:10
62:9,10,14,19
64:16,23 67:1
68:14,15,23 90:14
90:25 91:13,25
93:25 95:16
104:18 116:3,24
117:4,23 125:13
125:15,20 134:4
134:17,22,23
141:22
ways 68:14 90:6
94:12 95:15 99:7
144:18
we'll 10:20 13:8
64:9 69:5 80:22
96:7,8 129:7
131:15 150:16
we're 8:16 22:18
40:8 41:24 47:24
48:15 50:12 53:11
53:25 60:14,19
61:18,19 62:15
68:20 76:21,21
83:21 96:1 97:2,6
99:21 100:18
104:13,21 120:17
120:22 124:25
127:15 138:21
139:18 140:19
141:1 142:14
144:15 146:7,8,14
150:4
we've 18:1 25:15
49:11,17 89:2
92:25 95:24 96:11
112:22 118:22
119:5,14 126:23
130:9 141:4,21
142:11 148:5
150:12
website 46:11
weigh 117:10
weight 92:1 93:7
94:14 139:25
weighting 92:2
106:11
Weishaar 3:20 6:12
6:12 33:4,5 60:2
101:12 104:11
121:11
welcome 4:3 5:20

well-handled 92:17
92:19,22
well-intentioned
26:6
well-represented
10:6
went 49:16 53:22
55:16 57:22 103:2
weren't 81:11
western 26:22 51:4
wheel 37:6 51:22
52:9,11 72:12
73:7,22 82:25
85:15
whip 101:10
white 47:20
who-caused-the-p...
137:25
wholeheartedly
46:17
willing 31:7
winners 15:11 62:12
wisely 15:1
wish 5:4 55:13
132:17
wishes 54:22
withdrawal 29:25
withstand 81:16
Wood 3:23 6:16,16
46:12,12 65:10,10
98:5,19
word 89:8
words 35:23 58:11
81:11
work 16:6 23:10
24:12 25:2 26:15
31:23 49:12 54:6
71:11 77:22 88:7
88:11,17 99:10
106:4 136:20
144:16,22
worked 20:6 26:13
working 108:14
works 8:22,22 10:25
13:17 27:19 71:6
83:18
world 42:25 66:8
worse 88:14,15
worth 87:19 95:6
109:10
wouldn't 76:16
100:22 106:24
116:4 122:23
137:13 139:3
wrong 16:7 18:17
19:23 24:11 30:1

wrote 34:13	75:24,24 76:12	**12th** 150:18	**4** 38:18
wrought 19:25	78:22 80:1,11	**138** 43:10	**4,000** 43:8 45:6
	81:5 85:13 96:21	**15** 8:15 109:11	**40** 43:14 67:11
X	97:5 102:16,20,21	**153** 52:19	81:15 148:16
X 1:3,6,11,17,21,23	104:13 109:13,19	**16** 11:19,20 102:18	**40-year** 65:2
1:25	110:11,25 111:6	**169** 101:17	**400** 53:16
	112:5,16,19	**17** 43:24 72:18	**45** 44:3 53:18 73:14
Y	113:23 114:1,1	**18** 52:16 72:19	**48** 139:24
yeah 69:13 114:15	124:12,13,16,17	**1976** 108:15	
123:3 132:2,25	126:4,24 127:23		**5**
147:7	127:24,25,25	**2**	**5** 53:17
year 10:16 31:23	128:3 146:13,22	**2** 38:8,9 58:25	**50** 81:15 106:12,12
63:2 66:20,25,25	146:25	**2:45** 131:14	114:13 125:15
67:10,10 79:12,20	**zone's** 126:7	**2:55** 131:15	126:3,12 140:3,5
79:22,23 82:1,5,8	**zones** 13:7 17:18,23	**20** 56:4 73:4 121:1	**50/50** 106:12
90:23,23 101:3	22:2,5 31:20,24	**2005** 26:22	**500** 39:19,24 43:2,4
108:14,17 118:21	32:2 35:4 69:4	**2010** 72:23	43:8,9 72:3 79:3
118:22 120:25	94:1,8,12 97:25	**2010-2011** 45:19	**500-kV** 139:23
123:13 138:6	101:22 126:22	**2012** 25:2 26:25	**500,000** 72:3
140:8,24,24	135:19	**2012-2013** 45:20	**503** 107:15 125:4,4
years 8:24 21:10		**2013** 22:16,22 23:13	125:9
43:15 66:23 67:11	**0**	33:14 55:17	**53** 41:8
72:22,22 79:21	**0.2** 50:20	**2015** 4:9 35:21 83:7	
80:15 81:3 88:3	**0.4** 50:21	83:18	**6**
88:13,13 91:2		**2016** 2:5 150:18	**6** 40:5 103:19
92:3 96:25 97:1,3	**1**	**20426** 2:4	**60** 26:20
103:3 106:21,21	**1** 45:3,3 58:25 65:12	**210** 43:2	**660** 47:4,8
106:23 109:11	85:4 91:23	**230** 45:8 47:19,25	
110:13 113:2,6	**1,000** 82:21	49:15 57:6,7,14	**7**
121:1 135:8,12	**1,200** 36:20 102:5	124:17	**7** 40:25
137:20 138:7,7	**1,600** 28:25	**235** 47:22	**74** 26:18,20
148:16	**1.1** 28:16	**246** 33:23	**7th** 51:3
yellow 42:23 47:18	**1.2** 144:12	**24th** 4:9 55:1 58:4	
York 1:8 10:18 30:7	**1.25** 99:3	**275** 56:2 101:20	**8**
47:6,6,7,13,21	**1:30** 86:3,7	**28** 44:3	**8** 41:4
48:11,20,21,22	**10** 8:15 34:7,10	**29th** 35:21	**80** 53:20 73:10,11
51:16 73:13,15,21	42:12 53:19,22		98:14 129:16
81:23,23 82:3,8	88:3,13 103:3	**3**	130:12
82:11,19,20 83:1	106:23 113:6	**3** 38:10 59:1 103:13	**81** 26:20
83:2,6,7,10,11,13	138:7	**3,000** 33:10	**850** 52:19
83:18 85:11,15,18	**10-minute** 131:14	**3,800** 43:25 44:13	**888** 2:3
85:19	**10:00** 2:8 4:2	44:14 45:9 124:17	**89** 33:23
	150:18	**3:30** 150:19	**890** 28:16
Z	**100** 10:16 52:17	**30** 43:14 91:2 92:3	
zero 32:4 113:24	53:10,21	98:13 110:13,16	**9**
zonal 76:4,5 107:18	**1000** 42:6	135:11 137:20	**9** 42:4
zone 13:7 17:23	**11** 43:19 55:4	**300** 49:11	**90** 34:9,24 56:1
20:20 21:19,25	**11:40** 60:14,16	**300,000** 72:3 112:18	**90's** 83:4
22:24 23:5 25:17	**12** 2:5 22:14 23:21	**30th** 49:17	**90,000** 109:10,11,12
26:19 28:24 29:14	23:25 24:2 25:10	**320** 47:9 49:14	**90/10** 106:14
30:21,24 33:24	26:7,12 31:3,17	**330** 31:25	**95** 26:14
34:2,8 35:1,5	31:19 32:20,22	**345** 47:21	**99** 33:25 110:11
45:21,24 56:4,5	34:6 35:19 37:2	**360-degree** 118:10	121:3 136:15
57:12,13,19 58:2	37:22 98:22 99:13	**3M** 2:1	
67:9,11 70:3,13	103:19		
70:16 71:16 75:14	**12:32** 86:2	**4**	