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BEFORE THE ARIZONA POWER PLANT
AND TRANSMISSION LINE SITING COMMITTEE

IN THE MATTER OF THE) DOCKET NO.
APPLICATION OF DCR) L-21088A-19-0309-00185
TRANSMISSION, L.L.C. OR ITS)
ASSIGNEES, IN CONFORMANCE WITH))
THE REQUIREMENTS OF A.R.S.) CASE NO. 185
§ 40-360 et. seq., FOR A)
CERTIFICATE OF ENVIRONMENTAL)
COMPATIBILITY AUTHORIZING THE)
500 KV TRANSMISSION LINE,)
WHICH INCLUDES THE)
CONSTRUCTION OF A NEW 125 MILE))
500 KV TRANSMISSION LINE)
BETWEEN ARIZONA PUBLIC SERVICE))
COMPANY'S DELANEY SUBSTATION)
UNTIL SOUTHERN CALIFORNIA)
EDISON'S COLORADO RIVER)
SUBSTATION, TO BE REFERRED TO)
AS THE TEN WEST LINK PROJECT.)
_____)

14 At: Phoenix, Arizona
15 Date: January 23, 2020
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1 BE IT REMEMBERED that the above-entitled and
2 numbered matter came on regularly to be heard before
3 the Arizona Power Plant and Transmission Line Siting
4 Committee at the Phoenix Plaza Conference Facility,
5 2909 North Central Avenue, Phoenix, Arizona, commencing
6 at 9:20 a.m. on the 23rd of January, 2020.

7

8 BEFORE: THOMAS K. CHENAL, Chairman

9 JACK HAENICHEN, Public Member
10 KARL GENTLES, Public Member
11 MARY HAMWAY, Cities and Towns
12 JAMES PALMER, Agriculture
13 LAURIE WOODALL, Arizona Corporation Commission
14 JOHN RIGGINS, Arizona Department of Water Resources
15 LEONARD DRAGO, Department of Environmental Quality
16 GIL VILLEGAS, JR., Counties

17 APPEARANCES:

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For the Arizona Corporation Commission Staff:

Mr. Julio Antonio Arias
Staff Attorney, Utilities Division
1200 West Washington Street
Phoenix, Arizona 85007

1 CHMN. CHENAL: Good morning, everyone. This
2 is the time to resume the hearing on the Ten West Link
3 CEC application. I see we have a full Committee today.

4 Are there any procedural matters we should
5 discuss before we begin with the next panel,
6 Ms. Grabel?

7 MS. GRABEL: Chairman, yes, we do have a
8 couple of exhibits that respond to requests from the
9 Committee yesterday that I'd like to just go ahead and
10 pass out right now, if that's all right.

11 CHMN. CHENAL: Fine.

12 MS. GRABEL: The first we have marked as
13 Exhibit DCR-25, which responds to Member Woodall's
14 request for the CAISO active interconnection queue.
15 That's the first document, which lists all of their
16 interconnection requests; and then the second larger
17 document are the three projects that are in the queue
18 specific to the Ten West Link project.

19 The second document is DCR-26, and that is
20 also responsive to Member Woodall's request for just
21 general information about the types of requirements
22 that the CAISO has related to generation
23 interconnection. And so we are providing with
24 Committee with the CAISO's form of large generator
25 interconnection agreement, as well as its application

1 minimum requirements, which should give you some
2 general ideas as to the type of things CAISO looks for
3 in generation interconnection requests.

4 We are still looking for the study of the
5 non-wires alternative that the BLM conducted. The link
6 we found on the CPUC website was actually to the
7 summary, so we've actually sent an e-mail out to the
8 CPUC Staff who conducted the analysis to see whether or
9 not we can actually get that for the Committee. So
10 we're trying hard; we just don't have it quite yet.

11 CHMN. CHENAL: Thank you for your efforts.

12 So Ms. Grabel, could you again explain, on
13 Exhibit DCR-25, the difference between the first -- the
14 active queue list, consisting of six pages, and then it
15 looks like the last colored page, 1 of 1, what the
16 differences are between those two, or why these three
17 are separated out on the last page.

18 MS. GRABEL: Certainly, Chairman. So we
19 understood Member Woodall's request to be all of the
20 active interconnection requests in the CAISO's queue in
21 Arizona, and that's what the first shorter template
22 represents. The longer one that's in color are those
23 specific to the Ten West project, so those are the
24 interconnection requests specific to Ten West Link.

25 And you see that identified under station or

1 transmission line, which is the 17th row over on that
2 document.

3 CHMN. CHENAL: All right. Maybe we can --
4 during the course of the presentation maybe someone
5 could speak a little about these or --

6 MS. GRABEL: Certainly.

7 CHMN. CHENAL: -- if Mr. Amirali has the
8 opportunity, maybe he can discuss it in a little more
9 detail.

10 MS. GRABEL: I think that that's correct. If
11 any Committee Members have questions about these
12 documents, I think Mr. Amirali is exactly the right
13 person to ask.

14 MEMBER HAENICHEN: Mr. Chairman.

15 CHMN. CHENAL: Yes, Member Haenichen.

16 MEMBER HAENICHEN: I didn't quite understand
17 the last discussion. Do these documents show or
18 justify or whatever you want to call it all the myriad
19 of requests that are for interconnection onto this line
20 that we're mentioning in the application, which is
21 going to oversubscribe it?

22 MS. GRABEL: Member Haenichen, this will --
23 the second longer page that's colored within Exhibit
24 DCR-25 does show the three active interconnection
25 requests that are currently in the CAISO queue with

1 respect to the Ten West Link project, and it identifies
2 them by megawatt. And I believe that any questions
3 about this are best posed to Mr. Amirali.

4 MEMBER HAENICHEN: Thank you.

5 CHMN. CHENAL: And thank you for getting
6 those documents together.

7 Are there any other procedural issues we need
8 to discuss?

9 Mr. Arias.

10 MR. ARIAS: Thank you, Chairman.

11 Chairman, Members of the Committee, Antonio
12 Arias for Staff.

13 I talked with the Applicant, and we were
14 going to have -- we are planning to have Toby Little,
15 the Staff's witness, testify tomorrow, Friday, after
16 the technical panel or the Panel Number 2.

17 CHMN. CHENAL: And I believe that Panel
18 Number 2, technical panel, is before us today. But we
19 can take your witness tomorrow, that's fine.

20 MR. ARIAS: Chairman, that would be
21 preferable.

22 CHMN. CHENAL: Sure. Because I don't know
23 where we're going to end up today. We may finish
24 today, we may not. But certainly we'll take your
25 witness tomorrow.

1 MR. ARIAS: That's fine with us.

2 Chairman, just one more thing. I have
3 provided hard copies to the Committee of our direct
4 testimony and our presentation, which we will be giving
5 when Toby testifies. Would you like those labeled S-1
6 and S-2 for Staff's Exhibit 1 and Staff's Exhibit 2, or
7 are the hard copies that you have sufficient?

8 CHMN. CHENAL: I think they should be -- we
9 like three-letter designations. Let's put ACC-1 and
10 ACC-2 to denote those two exhibits.

11 MR. ARIAS: Okay, thank you.

12 CHMN. CHENAL: Fair enough.

13 All right. Anything further? We'll have
14 to swear in Ms. Chang before we begin the panel.

15 The other two witnesses, Mr. Rogers and

16 Mr. Amirali --

17 I'm sorry, I'm going to say it with a French
18 pronunciation. Amiral, a-m-i-r-a-l, is French for
19 admiral. Admiral, as in admiral in the Navy, a Navy
20 admiral. So Amirali is going to come out; I'm sorry if
21 it offends you. I'll do my best.

22 (Judy Chang was duly sworn by the Chairman.)

23 MS. GRABEL: Ready to proceed?

24 CHMN. CHENAL: Ready to proceed. Thank you.

25 MS. GRABEL: So for the Committee, just to

1 remember, we're going to take Ms. Chang first, then
2 Mr. Amirali, and then end with Mr. Rogers.

3

4 JUDY CHANG, ALI AMIRALI, AND LOWELL ROGERS (PANEL 2),
5 called as witnesses on behalf of the Applicant, having
6 been previously sworn by the Chairman to speak the
7 truth and nothing but the truth, were examined and
8 testified as follows:

9

10 DIRECT EXAMINATION

11 BY MS. GRABEL:

12 Q. Ms. Chang, will you please state your name
13 and business address for the record.

14 A. (BY MS. CHANG) Yes. My name is Judy Chang.
15 I am employed by The Brattle Group. And my business
16 address is 1 Beacon Street in Boston, I think it's
17 02108.

18 Q. And what capacity do you have at The Brattle
19 Group?

20 A. (BY MS. CHANG) I'm a principal of The
21 Brattle Group, as well as a colead of our energy
22 practice.

23 Q. Thank you. And you have before you a binder
24 of exhibits?

25 A. (BY MS. CHANG) Correct.

1 Q. If you could please turn to Exhibit DCR-12,
2 which is the testimony summary of Judy Chang.

3 A. (BY MS. CHANG) Yes.

4 Q. Have you seen this document before?

5 A. (BY MS. CHANG) Yes.

6 Q. Was it prepared by you or under your
7 direction and control?

8 A. (BY MS. CHANG) Yes.

9 Q. And does the summary accurately convey the
10 testimony that you intend to provide to the Committee
11 today?

12 A. (BY MS. CHANG) Yes.

13 Q. And if you'd please to turn to Exhibit
14 DCR-13, which is the witness presentation of Judy
15 Chang.

16 A. (BY MS. CHANG) Yes.

17 Q. Have you seen this document before?

18 A. (BY MS. CHANG) Yes.

19 Q. Was this presentation prepared by you or
20 under your direction and control?

21 A. (BY MS. CHANG) Yes.

22 Q. Is the information contained in this
23 presentation true and correct, to the best of your
24 knowledge?

25 A. (BY MS. CHANG) Yes.

1 Q. And the presentation reflects the findings of
2 a study that was conducted by The Brattle Group,
3 correct?

4 A. (BY MS. CHANG) Correct.

5 Q. Thank you. If you will please turn to
6 Exhibit DCR-14.

7 A. (BY MS. CHANG) Yes.

8 Q. Have you seen this document before?

9 A. (BY MS. CHANG) Yes.

10 Q. Is this the report on which your presentation
11 was based?

12 A. (BY MS. CHANG) Yes.

13 Q. Was the report prepared by you or under your
14 direction and control?

15 A. (BY MS. CHANG) Yes.

16 Q. And is the information contained in Exhibit
17 DCR-14 true and correct, to the best of your knowledge?

18 A. (BY MS. CHANG) Yes.

19 Q. Thank you. I have no further questions at
20 this time. Please begin your presentation.

21 A. (BY MS. CHANG) Thank you.

22 Good morning, Chair, and Members of the
23 Committee. I'm very grateful to have this opportunity
24 to present before you.

25 I'm going to start with a presentation that

1 has been prepared and you have a copy of, but certainly
2 feel free to interrupt and ask me any questions that
3 you would like.

4 Again, my name is Judy Chang. I'm a
5 principal with The Brattle Group. It's an economic
6 consulting company. We have 11 offices. I am in our
7 Boston office. I have over 20 years of experience in
8 the power sector, and now currently lead our energy
9 practice of The Brattle Group.

10 And just very briefly, I have been working on
11 renewable generation transmission-related topics over
12 the last 15 years or so, and other work that I do
13 includes market design, simulations of the market.
14 When I say "market," I mean power systems and power
15 sector markets. And I have authored numerous reports
16 regarding the value of transmission and how to evaluate
17 cost and benefits associated with transmission
18 projects.

19 I have testified before FERC, the Federal
20 Energy Regulatory Commission, as well as states'
21 regulatory committees and regulatory bodies, as well as
22 in Canada, regulatory bodies in Canada. I do work
23 across North America, as well as Australia and
24 southeast Asia, on various different topics primarily
25 relating to integrating of renewable energy into the

1 systems relating to transmission, integrating new
2 transmission, evaluating the value of transmission, as
3 well as design and redesign and improving markets,
4 energy markets, as well as, in some cases, capacity
5 markets. I think, in a nutshell, that speaks to my
6 experience.

7 I have an undergraduate degree in electrical
8 and computer science from University of California
9 Davis, and I have a master's in public policy with
10 emphasis in economics from Harvard Kennedy School.

11 In my presentation, I have four segments.
12 The first segment is really an executive summary, so
13 I'm going to talk about the specific benefits of this
14 transmission project to Arizona, and then I'm going to
15 focus in on the specific benefits in the latter three
16 sections.

17 The first one is reducing Arizona's
18 customers' costs and enhance power system efficiency.
19 The third section is about increasing access to clean
20 energy and opportunities for more efficient regional
21 collaboration for Arizona. And the fourth one is how
22 this project can stimulate Arizona's economy, including
23 employment, values, and production, associated with
24 both the project, as well as solar and solar plus
25 storage resources that might be induced by this

1 project.

2 CHMN. CHENAL: Member Woodall.

3 MS. CHANG: Yes.

4 MEMBER WOODALL: Is it Ms. or Mrs. Chang? Do
5 you have a preference?

6 MS. CHANG: M-s.

7 MEMBER WOODALL: Ms. Chang.

8 MS. CHANG: Yes.

9 MEMBER WOODALL: I saw in your agenda your
10 four items. And I wonder, because I'll be asking
11 questions, but I kind of wanted to give you a head
12 start, I think this is what they call a macroeconomic
13 study, or am I wrong?

14 MS. CHANG: That's a good question. I
15 consider all the simulations of the power system, which
16 I will present and articulate the value of the
17 transmission, those are micro in the sense that it's
18 power system economics.

19 The last one, which is the Arizona economy,
20 that is typically thought of as macroeconomic because
21 it talks about labor, it talks about employment, and
22 macroeconomic stimulus impact.

23 MEMBER WOODALL: And I'll just give you an
24 advanced notice that I note that, as part of your
25 analysis in your report, you included benefits from

1 anticipated renewable generation in Arizona; is that
2 correct?

3 MS. CHANG: Correct.

4 MEMBER WOODALL: Okay. I'm going to probably
5 ask you, at the conclusion of your presentation, why
6 should we be considering that as an economic benefit
7 for the line. I see you've got them separated under
8 two.

9 MS. CHANG: Sure.

10 MEMBER WOODALL: So that's going to be an
11 area of focus for me, and I just wanted to give you a
12 heads up.

13 MS. CHANG: No problem.

14 MEMBER WOODALL: So now I'm prepared to sit
15 back and be dazzled. I've read many Brattle reports,
16 and I think it's one of the preeminent consulting
17 firms. Been very helpful to me, so...

18 MS. CHANG: Thank you very much.

19 MEMBER WOODALL: You're welcome.

20 MS. CHANG: This slide is a summary of
21 material you already heard yesterday. Ten West Link is
22 a 125-mile 500 kV transmission line connecting Delaney
23 Substation in Arizona to the Colorado River Substation
24 in California. This was identified and approved by the
25 CAISO in its 2013, 2014 transmission planning process.

1 It has selected -- the California ISO has
2 selected DCRT as a sponsor of the project through a
3 competitive process that concluded in July of 2015. It
4 is scheduled -- this project is scheduled to begin
5 construction later this year and achieve operations in
6 December 2021.

7 Before you, the sponsor, DCRT, is here to
8 secure a Certificate of Environmental Compatibility,
9 CEC, prior to construction. And my goal here is to
10 explain to you how this project achieves and meets the
11 needs of Arizona in a reliable and adequate and
12 economical manner. And the report that's associated
13 with this presentation and my presentation is to
14 explain how we have done the analysis and how that
15 brings value to Arizona.

16 CHMN. CHENAL: Member Woodall.

17 MEMBER WOODALL: Mr. Arias, I know that in
18 the past this language has been included -- "for
19 adequate economical" has been included in CECs. And
20 it's my understanding that this language has, in at
21 least one case, been cited as determination of the
22 prudence of the particular project as it might relate
23 to a rate case. And so at some point, I'm going to ask
24 you questions regarding that. Thank you.

25 MS. CHANG: Okay. Slide 6 here is

1 essentially an executive summary of all the benefits
2 that I will then articulate and try to explain in more
3 detail. In general, we categorize them in three things
4 in answer to the meeting the needs of Arizona in the
5 adequate, economical, and reliable manner.

6 First, economic analyses associated with this
7 project, the Ten West Link, we show that it provides:
8 2 to \$7 million a year reduction in the cost of
9 supplying energy to Arizona customers; 140 to 560
10 gigawatt hours per year increase in the output of the
11 generators located in Arizona; which increases the
12 market value of the Arizona generation by 95 to
13 \$153 million a year; simultaneously reducing the cost
14 of production across WECC, of which Arizona is a part
15 of, by 25 to \$54 million per year; and a slight
16 reduction in energy losses across the WECC. That's
17 under the economics of the value of the project.

18 I see a question.

19 CHMN. CHENAL: Ms. Chang, yes, thank you.
20 Are you going to discuss in more detail those numbers
21 and how you came to those conclusions?

22 MS. CHANG: Absolutely.

23 CHMN. CHENAL: So I can reserve my questions
24 until you get to that part of your presentation?

25 MS. CHANG: Yes, absolutely.

1 CHMN. CHENAL: Thank you.

2 MS. CHANG: Second, adequate supply. This
3 project provides additional transmission infrastructure
4 that facilitates interconnection of new solar and solar
5 plus storage resources in Arizona. And you'll hear me
6 talk about this as well in the detailed explanation.

7 It expands regional access to diverse supply
8 for Arizona. This is about access to low-cost, clean
9 energy outside of Arizona, as well as inside Arizona.
10 It enables opportunity for regional coordination. I
11 will talk about the energy imbalance market and the
12 potential expansion of other regional markets.

13 And this project, the transmission line, will
14 increase the transfer capability associated with
15 Arizona, and therefore, increases Arizona's capability
16 and future access to resources outside of Arizona.

17 And then lastly, and of course most
18 importantly, this line significantly increases the
19 reliability of the transmission system in the southwest
20 region, which is why, in the very beginning, California
21 ISO has identified it as a reliability and economic
22 project.

23 Okay. Talking about the macroeconomic
24 stimulus impact, and again, we will get into the
25 details later as well. So if I don't address your

1 questions by presenting it, please definitely ask when
2 I get through the economic stimulus.

3 But in a general sense, I'm not going to read
4 all the numbers on this slide, but generally speaking,
5 there are two segments of macroeconomic stimulus that
6 our report presents. One is the construction of the
7 Ten West Link itself, the transmission project; it
8 provides employment, as well as macroeconomic stimulus
9 for Arizona.

10 Associated with the project, we also assume
11 approximately half of the solar or solar plus storage
12 projects will be enabled by this project. As you see
13 that there are interconnection requests in Arizona,
14 both for interconnecting into California ISO's
15 system -- and I will explain that a little bit more
16 later -- as well as interconnecting to the APS
17 transmission system.

18 These projects, of course, not every single
19 one of those solar and solar plus storage will be
20 developed, so we have assumed about half of them are
21 enabled by the -- by this transmission project. And
22 with that assumption, we then estimated the type of
23 spending associated with those solar and solar plus
24 storage projects, and that's what you see on the
25 right-hand column of this table.

1 So we did separate out the impact, the
2 associated impact with the project itself, the
3 transmission, and then separately the solar resources
4 that could be enabled or are likely to be enabled by
5 the transmission.

6 What we didn't include in this report, and I
7 will -- let me just finish one more thought about this.
8 What we did not include is potential additional
9 businesses that would be attracted to Arizona's economy
10 associated not just with the line, but also the
11 renewable energy that it enables.

12 Because one of the things that I have been
13 working on, actually very closely, are with
14 customers -- large commercial and industrial customers
15 are looking for sites where they are closely associated
16 or can closely claim that renewable energy can be used
17 to power their systems, particularly data centers.

18 So having not spent a lot of time analyzing
19 exactly which customer will move to Arizona, I know in
20 general the addition of renewable resources is an
21 attractive factor for many new commercial and
22 industrial customers. We have not at all accounted for
23 those macroeconomic stimulus impact in this analysis,
24 but I do think that's an important factor.

25 And then one last factor. As you saw

1 earlier, we said that we found 2 to \$7 million
2 reduction in the cost of energy, electric energy for
3 Arizona customers. We also have not accounted for the
4 economic stimulus associated with customers having more
5 money in their pockets to spend in the economy. So
6 this is a --

7 CHMN. CHENAL: Couple quick questions --

8 MS. CHANG: Yes.

9 CHMN. CHENAL: -- Ms. Chang, before you get
10 on to more points, and I'm going to lose the thought --

11 MS. CHANG: Okay, sure.

12 CHMN. CHENAL: -- process of the questions I
13 have for the points you've already made.

14 First question: With regard to the other
15 businesses, such as data centers, that you don't really
16 include in your analysis, are those, for example, data
17 centers for Arizona or California?

18 MS. CHANG: Arizona.

19 CHMN. CHENAL: Okay. Next question: The new
20 solar construction numbers that you have in your study,
21 that basically is approximately half of what you
22 anticipate the effect of this line in promoting new
23 solar plants?

24 MS. CHANG: Correct.

25 CHMN. CHENAL: We have an exhibit that was

1 presented to us this morning, Exhibit DCR-25. And you
2 might have heard some of the discussion about this
3 before you began your testimony.

4 MS. CHANG: Yes.

5 CHMN. CHENAL: There are three projects that
6 are basically -- have requested interconnection with
7 this line. Are those -- so I guess my question is:
8 Are those the projects that you are referring to for
9 your new solar construction numbers? Are those the
10 basis for these numbers?

11 MS. CHANG: Correct.

12 CHMN. CHENAL: Or are there other projects,
13 in addition to the three that are listed on the last
14 page of that exhibit, that you also are considering in
15 your analysis?

16 MS. CHANG: There are -- there are
17 significant amounts of solar resources, solar plus
18 storage resources that have requested interconnection
19 with the California ISO, and that's what was presented
20 to you in the exhibit presented this morning.

21 In addition, there are also about 900
22 megawatts of solar or solar plus storage resources
23 requesting interconnection to the APS utility.

24 So I consider both of those requests as
25 resources that are enabled by the transmission line.

1 So what you have before you in the exhibit, as I
2 understand, is only the request to the California ISO's
3 interconnection queue.

4 CHMN. CHENAL: Okay. I'm going to need a
5 little help with this.

6 MS. CHANG: Yes.

7 CHMN. CHENAL: How these numbers were
8 developed, I mean, what projects you are basing these
9 numbers on in terms of new solar production and
10 generation storage, and I guess I don't understand.
11 I'm assuming that this line will generate this
12 additional solar construction. But in your answer you
13 just gave, you took into consideration the projects
14 that are in the planning stage that would like to
15 interconnect to the CAISO system, and I'm not
16 understanding how connecting to the CAISO system is
17 directly related to this construction of this line. So
18 if you could help explain that, it would help.

19 MS. CHANG: Yes, absolutely. So first of
20 all, there is an interconnection queue, which this
21 presented to you in the morning is a snapshot of
22 what -- all of the generation that are requesting
23 interconnection to the CAISO system. That is part
24 of -- if you want to connect to the system, you have to
25 make a request.

1 Similarly, Arizona utilities have an
2 interconnection queue. Any utilities that have a
3 transmission system will have to have an
4 interconnection queue. Because if you want to connect
5 to APS, you also have to make a request.

6 For this analysis, for the macroeconomic
7 analysis, we only looked at solar and solar plus
8 storage resources that we believe are enabled by the --
9 this transmission project, but these projects can be
10 requesting interconnection to California ISO's system,
11 or they can be requesting interconnection to the APS
12 system. Both of these types of resources, in our
13 minds, are enabled by this transmission project,
14 which -- just one more second.

15 So the portion that's requesting
16 interconnection to the California ISO is only a -- is
17 consistent with what you see in the -- in the exhibit
18 this morning.

19 CHMN. CHENAL: Okay. But, I mean, I suppose
20 I could develop a solar plant somewhere in California
21 and tie into or interconnect with the CAISO system --

22 MS. CHANG: Correct.

23 CHMN. CHENAL: -- and have -- which may have
24 nothing to do with the construction of this line.

25 MS. CHANG: Correct.

1 CHMN. CHENAL: So how did you analyze, in
2 coming up with these numbers, that these new solar
3 construction, you know, numbers, employment, all that,
4 would be directly related to this line versus tying
5 into the CAISO or the APS systems through some other
6 line, if that makes sense?

7 MS. CHANG: That's a very good question. We
8 only considered interconnection requests that -- whose
9 request came after the knowledge of this line, and they
10 are requesting interconnecting at the terminus of this
11 line.

12 CHMN. CHENAL: Okay.

13 MS. CHANG: So they're not just any
14 generators in California trying to request connecting
15 to the California system, which, of course, you have
16 the entire list, but we only took the subset that we
17 think are enabled by this project, and we took
18 50 percent of that only, because we don't believe all
19 of those --

20 CHMN. CHENAL: And that list, do you have a
21 list of --

22 MS. CHANG: Yeah, just one second.

23 MS. GRABEL: Mr. Chairman, your question is
24 actually answered on DCR Exhibit 25, on the long page.
25 If you add up the three interconnecting projects, they

1 total 4,150 -- 4,150 megawatts of anticipated solar,
2 and that's the number on which the Brattle report was
3 based. And I think Ms. Chang will address that later
4 in her presentation on Page 17. So that ties DCR-25 to
5 Ms. Chang's presentation.

6 CHMN. CHENAL: That really answers the
7 question. I just want to make sure that --

8 I misunderstood your testimony, Ms. Chang. I
9 thought you were saying you were taking into
10 consideration all potential solar generation and
11 storage tying into the CAISO system. But you have
12 basically -- your analysis is based on the three
13 projects that are listed --

14 MS. CHANG: Correct.

15 CHMN. CHENAL: -- on the last page --

16 MS. CHANG: Correct.

17 CHMN. CHENAL: -- of DCR-25.

18 MS. CHANG: Yeah. Let me just articulate a
19 little bit. So the three projects that are requesting
20 interconnecting to the CAISO system, plus 900 megawatts
21 that are requesting interconnection to the APS system
22 that's not on this list, and we took 50 percent of
23 that.

24 CHMN. CHENAL: All right, thank you.

25 Member Woodall.

1 MEMBER WOODALL: Yes. Back to your
2 presentation where you -- well, right here on, I
3 believe it's Slide 7, you have economic stimulus
4 impact. It is my understanding that there are
5 different computer models that are used to assess
6 direct and indirect benefits, and then I think there's
7 another more vague one than that.

8 So I want to ask you, do these reflect more
9 than direct benefits, the ones that you have on
10 Exhibit 7?

11 MS. CHANG: Yes, good question. Typically
12 these are called input-output models. Inside the model
13 has the information about the local economy, and these
14 models are -- this particular one we use is IMPLAN.
15 What it does is it takes a particular spending as a
16 shock into the economy, and then it evaluates how those
17 monies spent would be rippling through the economy, in
18 this case, Arizona's economy.

19 And there are three types of benefits or
20 potential impact, let's say, as you said. One is
21 direct impact, and I will explain; one is indirect
22 impact; and then the third one is induced impact.

23 The direct impact is the actual spending of
24 the project, the payment to the people who work on the
25 project, the cost, the payment to secure the material

1 that stays in the economy in Arizona. This is not just
2 spending that goes outside of the economy. It only
3 accounts for the spending inside Arizona and stays
4 inside Arizona.

5 The second is indirect benefits. Indirect
6 benefits means you buy cables -- or, let's say you buy
7 cement to build the transmission towers. That supplier
8 of the cement has a particular -- some of the money
9 goes to the supplier of the cement, and that's an
10 indirect impact.

11 The third impact is called induced impact.
12 The induced impact is saying, okay, the folks that --
13 let's say the cement supplier have people who work for
14 those companies, they receive a payment for their
15 employment, and they're spending in the economy, they
16 go to restaurants and they buy other things.

17 All of this analysis is making assumptions
18 based on data that we get from the developer. How much
19 money will be spent in Arizona that are likely to stay
20 inside Arizona, and how it ripples through the economy.

21 MEMBER WOODALL: And you mentioned the term,
22 I think, "local economy." So what was the local
23 economy that you used to come up with these direct,
24 indirect, and induced benefits?

25 MS. CHANG: Yeah. The boundary of this

1 analysis, Arizona economy.

2 MEMBER WOODALL: So the entirety of the state
3 of Arizona?

4 MS. CHANG: Arizona, yes.

5 MEMBER WOODALL: Okay. I believe there was
6 an economic study that was done as part of the federal
7 environmental impact assessment. Did you do that work?

8 MS. CHANG: Yes.

9 MEMBER WOODALL: Okay. So all of the
10 information that is in the EIS regarding that is your
11 work product?

12 MS. CHANG: Yes.

13 MEMBER WOODALL: And so there's nothing new
14 and exciting about what you're testifying here today --
15 well, it might be more exciting because you're doing it
16 in person, but is it the same? Have you made any
17 changes from what you produced in the EIS?

18 MS. CHANG: You know, I have to go back to
19 compare the numbers. I believe there was a time where
20 we also looked at La Paz specifically.

21 MEMBER WOODALL: Yes, that was what I was
22 getting to, because I know there were a number of
23 comments that they were suggesting that the impacts
24 really should have been focused more on the local
25 economy. And I don't know whether that was a component

1 of your prepared testimony in Exhibit 14, which I
2 believe is your report.

3 MS. CHANG: Yeah. If you don't mind, I could
4 get back to you after a break to compare what we
5 produced and what we produced here.

6 MEMBER WOODALL: Sure. And I imply no
7 impropriety on the part of the Applicant or your firm
8 at all or anyone. I just want to know how was it
9 different.

10 MS. CHANG: Yes. And in general, in these
11 types of situations, we do -- we can analyze it for the
12 state as a whole or for a specific county. Basically,
13 we just need the data associated with the county.
14 Usually that means what kind of -- what kind of
15 suppliers are available in the county, how much of the
16 material can be secured from the county, and what the
17 labor and the employment costs would be in the county,
18 as opposed to the state as a whole.

19 Because this project, you know, runs more
20 than La Paz, it's actually -- from your perspective, I
21 think, it's probably more appropriate to look at
22 Arizona as a whole. But generally speaking, when these
23 types of projects traverse certain counties or segments
24 of the economy, the local community would like to know
25 what the impact is or would be on the local community,

1 and we do try to -- as long as we have the data
2 associated with the spending that stays within the
3 county and the economy, we try to conduct those
4 analyses as well.

5 MEMBER WOODALL: And Ms. Chang, I don't know
6 if you know this or not, but La Paz County is a party
7 to this matter. They are not going to be
8 participating, but it's possible that they may be
9 appearing before the Commission. So I would like to
10 get some evidence in the record that might reflect some
11 of La Paz County's expressed concerns, if I might.

12 MS. CHANG: Okay.

13 MEMBER WOODALL: So that's why I'm asking.
14 I'm not suggesting in any way there was any impropriety
15 at all.

16 MS. CHANG: Yeah.

17 MEMBER WOODALL: And so is there some way you
18 could tell us what the direct stimulus impacts are for
19 the Ten West Link connection? I mean, could you
20 apportion it by direct, indirect, and induced, or do
21 you just do one --

22 MS. CHANG: We do have that data, yeah.

23 MEMBER WOODALL: I personally don't require
24 that you go into great detail about it, but if you can
25 have a piece of paper somewhere that has it on there,

1 that would be -- as an exhibit, that would be helpful.

2 MS. CHANG: Yes. Actually, it's in the
3 exhibits as we put in the appendix slides. And if you
4 go to Slide -- I don't know if you have quick access to
5 it, but if you go to Slide 27, 28, and 29, you will see
6 the direct, indirect, and induced by county with
7 La Paz, Maricopa, and Arizona as a whole.

8 MEMBER WOODALL: Thank you for bringing that
9 to my attention. I require no further information
10 regarding that.

11 The only other question I wanted to ask was,
12 when were you first engaged on this project?

13 MS. CHANG: Oh, gosh.

14 MEMBER WOODALL: We know the EIS process was
15 shuffling along in 2005, so I'm just wondering when
16 your firm --

17 MS. CHANG: Oh, no. For this engagement, I
18 would say 2018.

19 MEMBER WOODALL: Excuse me, '15.

20 Pardon me?

21 MS. CHANG: I would say 2018.

22 MEMBER WOODALL: Okay. And so your analysis
23 is that which is reflected in the Federal EIS, is it?

24 MS. GRABEL: Member Woodall, there might be
25 some confusion as to which study you're referring to.

1 We actually thought we'd take a look at that on a break
2 and --

3 MEMBER WOODALL: Oh, yeah, why don't you
4 thumb through papers, or digital papers, and just kind
5 of let me know about that. I just want to know if
6 there's any difference.

7 MS. GRABEL: Certainly.

8 MEMBER WOODALL: And like I said, I imply no
9 impropriety at all. I just want to know.

10 MS. GRABEL: We'll review and let you know
11 after a break.

12 MEMBER WOODALL: Thank you so much.

13 MEMBER HAENICHEN: Mr. Chairman.

14 CHMN. CHENAL: Member Haenichen.

15 MEMBER HAENICHEN: Ms. Chang, for the benefit
16 of the Committee Members, that list you have down below
17 of five entities on this slide, would you go through
18 them one by one and tell us which ones of those are
19 one-off benefits and which ones are perpetual benefits?

20 MS. CHANG: That's a very good question.
21 Typically, when it comes to transmission -- and you'll
22 see in the title of the table columns, the second and
23 third column, all of these are impact during the
24 construction phase. So we have made no assumptions
25 about how many employees and ongoing O&M costs would be

1 associated with the line or with the solar and solar
2 plus storage.

3 So if your question is about are these
4 employment and impact that last 40 years, they are not.
5 To be conservative, this is just during the
6 construction phase -- phases of the transmission line,
7 as well as the solar projects.

8 MEMBER HAENICHEN: Could you please explain
9 in more detail the last item, taxes. What's the origin
10 of them and who's going to collect them?

11 MS. CHANG: That is a good question. These
12 are -- these are actually taxes out of the model.
13 They're not necessarily the exact amount of taxes that
14 the sponsor or the owner may pay over a period of time.
15 So this means that a certain amount of spending is done
16 in the state of Arizona. And making assumptions about
17 the amount of taxes, both at the state and the local
18 level, these are the estimated amount of taxes for the
19 project.

20 MEMBER HAENICHEN: So these are a one-time
21 thing, then, also?

22 MS. CHANG: I think I need to doublecheck to
23 see if this is a cumulative amount of taxes during the
24 construction phase or construction plus operations. I
25 need to get back to you on that after the break.

1 MEMBER HAENICHEN: Another question on this
2 packet we were given this morning.

3 MS. CHANG: Yes.

4 MEMBER HAENICHEN: So am I correct, then -- I
5 got the impression, in reading the large tome that we
6 were given earlier, that there were many, many requests
7 for interconnection, not just three. But right now,
8 these are the only three that we can consider, right?

9 MS. CHANG: Correct.

10 MS. GRABEL: Ms. Chang, may I clarify? Those
11 are the only interconnection requests made at the
12 CAISO, correct? There are others on the APS system
13 that you can also consider.

14 MS. CHANG: Correct. It's about 4,000
15 megawatts of solar and solar plus storage
16 interconnection requests for the CAISO system in
17 Arizona induced by this project, as well as 900
18 megawatts of solar that you don't see in the queues for
19 APS.

20 MEMBER HAENICHEN: Okay. Perfect lead-in to
21 my next question. These solar projects, are they
22 photovoltaic projects or are they thermal projects?

23 MS. CHANG: I believe they're photovoltaic
24 projects.

25 MEMBER HAENICHEN: You believe. You're not

1 sure?

2 MS. CHANG: Well, these days they are almost
3 always photovoltaic projects, and these are as well.

4 MS. GRABEL: And Member Haenichen, if you
5 actually look under generation facility type one, it
6 does identify two projects are photovoltaic and one is
7 storage.

8 MEMBER HAENICHEN: So then we could -- if we
9 got around to the stage of evaluating the CEC proposed,
10 we could put in language that limits this to
11 photovoltaic projects. Would that be an objection to
12 you?

13 MS. GRABEL: Member Haenichen, it would be an
14 objection, because one of the largest interconnections
15 is not strictly a photovoltaic project.

16 MEMBER HAENICHEN: Say that again. I didn't
17 follow it.

18 MS. GRABEL: Mr. Amirali.

19 MR. AMIRALI: Hi. Hello. Hi, Ali Amirali.
20 All three of the projects are photovoltaic -- solar
21 photovoltaic plus storage projects that you see in the
22 list right now. The projects in the APS queue are also
23 solar plus -- solar photovoltaic plus storage projects.

24 MEMBER HAENICHEN: Yeah, but my question was:
25 Could we put in a condition, then, that limited such

1 projects to that format?

2 MS. GRABEL: Mr. Amirali, go ahead and
3 address the question.

4 MR. AMIRALI: Sir, that is -- again, going
5 back to my statement regarding providing -- first of
6 all, ISO operating control of this facility plus
7 providing nondiscriminatory access to all market
8 participants to the ISO transmission grid. The ISO
9 does not pick winners or losers, neither in the case
10 of -- in the case of what projects can connect and what
11 projects cannot connect to a particular line or can
12 utilize the ISO's grid. That is -- so as such, a
13 limitation like that is something that we cannot agree
14 to.

15 And one thing, several of these projects that
16 come -- that are connecting in Arizona, if I understand
17 it correctly, come in front of this body for the Power
18 Plant Siting Committee, and, you know, Arizona is free
19 to do what they do. But as far as the condition on a
20 transmission asset is concerned and what power can
21 flow, that can, one, neither be controlled nor
22 monitored nor enforced, and it's something that we
23 cannot agree to.

24 MEMBER HAENICHEN: No, I don't think what you
25 said is correct. I don't believe that this Committee

1 has any jurisdiction over solar or wind generation
2 projects.

3 MR. AMIRALI: I was talking more about, sir,
4 when you mentioned like you can put a limit on what
5 projects can come, I was just going to say, you know,
6 in addition -- the other technologies, if the Committee
7 has an issue, that is something for this Committee to
8 decide. That's something we --

9 MEMBER HAENICHEN: But if it's a solar
10 project, we have no jurisdiction. So for example, a
11 very large solar thermal generation project would cause
12 me a lot of distress, and yet we have nothing to say
13 about it.

14 So in summary, then, we have no assurances
15 that generators that actually do connect to this line
16 later will not be thermal projects, is that true?

17 MS. CHANG: May I add one thing that maybe
18 will help your concern? I've recently looked at the
19 economics of solar thermal versus solar PV, and really
20 across the board, almost all of the solar projects
21 across North America are being developed as solar PV
22 because solar thermal just simply cannot compete with
23 solar PV. So maybe that's something that will relieve
24 you of some of your concerns.

25 MEMBER HAENICHEN: Can you refer us to any

1 documents that we can study that verify that?

2 MS. CHANG: Certainly. There are cost
3 estimates from Department of Energy that we can refer
4 you to.

5 MEMBER HAENICHEN: It doesn't surprise you at
6 all, then?

7 MS. CHANG: No, it doesn't surprise me at all
8 that solar PV is the solar technology that's being
9 developed, not just here in North America, but really
10 across the world, simply because of the economics of
11 the solar PV versus solar thermal.

12 MEMBER HAENICHEN: Why do you think that is?

13 MS. CHANG: Because solar PV, the panels cost
14 have dropped significantly in cost.

15 MEMBER HAENICHEN: True. But the efficiency
16 of collecting solar energy is much less for PV than
17 thermal, is it not?

18 MS. CHANG: Sorry?

19 MEMBER HAENICHEN: In other words, the amount
20 of the incident sunlight that gets converted to
21 electricity is less for PV than it is for solar
22 thermal, is that not true?

23 MS. CHANG: No.

24 MEMBER HAENICHEN: No?

25 MS. CHANG: The technological advancement in

1 solar PV has dramatically decreased the capital costs,
2 as well as the total levelized cost of solar PV.

3 MEMBER HAENICHEN: I know the cost has gone
4 down, but -- this is the physics that takes the amount
5 of conversion that you can get from PV.

6 MR. AMIRALI: Member Haenichen, if I may
7 interject. First of all, there are a couple of other
8 factors that are also involved. The solar -- even
9 though the conversion efficiency of solar PV is small,
10 there is no transfer -- there is no conversion,
11 secondary conversion to steam or any kind of material,
12 any kind of -- to a different source of heat is
13 required in there.

14 Secondly, the collecting capability of solar
15 thermal is not that much higher than solar PV projects.
16 In fact, the two solar thermal projects, the two large
17 solar thermal projects that have been built, they are
18 right across the border in Nevada, and, you know, those
19 are visible from space, frankly, they have not had the
20 same kind of solar production capability that was --
21 they have not reached even close to the design --
22 design efficiencies that they were promising.

23 They're all suffering economically, as well
24 as there is other permitting issues associated with
25 solar thermal projects as well. They occupy large

1 areas, just as much as solar PV projects, plus they
2 also require permitting because most of them have a
3 turbine associated with it, and they have got
4 supplemental gas as well. And as such, their
5 permitting process is a lot more stringent.

6 The cost -- from a cost comparison point of
7 view, there is no comparison between a solar -- on a
8 dollar per megawatt hour production capability basis,
9 there's not even a comparison between the two, between
10 the two technologies.

11 I can tell you that there were several solar
12 thermal projects that were proposed in the southwest
13 between 2007 and 2010; of those, only four got built.
14 And there is no application in the CAISO queue right
15 now, or in APS queue, for a conventional solar thermal
16 project.

17 MEMBER HAENICHEN: Well, if you're so sure of
18 that, then why would you object to a condition?

19 MR. AMIRALI: The reason for objection, sir,
20 is that it's a discriminatory practice.

21 MEMBER HAENICHEN: Yes.

22 MR. AMIRALI: FERC is -- you know, this is
23 something we cannot agree to.

24 MS. GRABEL: Mr. Chairman, if I may
25 interject.

1 CHMN. CHENAL: Sure.

2 MS. GRABEL: I believe any such condition,
3 Member Haenichen, would be illegal, because it would be
4 a violation of interstate commerce. I think that's the
5 way that it would be approached.

6 MEMBER HAENICHEN: Mr. Chairman, is that
7 true?

8 CHMN. CHENAL: I haven't researched it,
9 Member Haenichen, but I certainly understand the logic
10 of what's being said. Any more than a state could
11 impose restrictions on an interstate highway passing
12 through a state. If there are nondiscriminatory access
13 requirements to transmission lines, I certainly can
14 understand that.

15 Perhaps it would be helpful, Ms. Grabel, to
16 have just a short memo on that -- I mean, we've done
17 that in the past when legal issues have come up like
18 this -- to just kind of explain what Mr. Amirali has
19 just indicated.

20 MS. GRABEL: Certainly, we can do that.

21 CHMN. CHENAL: I think that would be very
22 helpful and think that would answer the question.

23 Yes, and Member Riggins has a question first.
24 And let's make sure Member Haenichen is finished with
25 his questions.

1 MEMBER HAENICHEN: Oh, I'm finished.

2 CHMN. CHENAL: Okay. So I think we could get
3 a memo on that, Ms. Grabel, and --

4 MEMBER HAENICHEN: The synopsis of it, from
5 my viewpoint, is that we -- there's no certainty about
6 what type of generation will be put -- eventually put
7 onto this line. Thank you.

8 MR. AMIRALI: May I add?

9 CHMN. CHENAL: Sure.

10 MR. AMIRALI: Member Haenichen and Chairman
11 Chenal, the only comment I would like to add is an
12 example. Several states -- in several states coal is
13 considered a four-letter word and, you know, there are
14 state policies prohibiting building of coal plants,
15 there are several states that do not want any nuclear
16 projects, or even, for that matter, permit any gas
17 projects.

18 However, if California ISO or PJM or even,
19 for that matter, APS receives a request for
20 interconnection of a coal project or a nuclear project,
21 they will have to accept that in accordance with the
22 regulations and according with the FERC rules. The
23 state has more than -- is more than capable of
24 declining those permits, but the transmission owner
25 cannot discriminate against any technology.

1 CHMN. CHENAL: Correct. And I think
2 what's -- what's maybe behind some of these questions
3 in regard -- with respect to thermal, solar thermal, is
4 the amount of water that's required. Obviously, that's
5 what's driving, I think, some of the concern here.

6 Member Riggins.

7 MEMBER RIGGINS: Thank you, Mr. Chairman.

8 Ms. Chang, and I might be jumping ahead, so
9 correct me. But we're seeing figures that are showing
10 and illustrating the economic benefits for Arizona.
11 And I was wondering, is there any similar figures for
12 benefits to California for ratepayers? CAISO -- and
13 correct me if I'm wrong -- but they facilitate the
14 project, they facilitate the line. So I was wondering
15 if there was any benefit, any economic benefit analysis
16 for California ratepayers, as well as the Arizona
17 ratepayers and customers.

18 MS. CHANG: Yes. As part of the regulatory
19 proceeding in California to get this project approved
20 in California, we have conducted similar analyses for
21 California.

22 MEMBER RIGGINS: Okay. Is that part of the
23 presentation? Will we see sort of a --

24 MS. CHANG: No, no, this is very much focused
25 on Arizona.

1 MEMBER RIGGINS: Okay.

2 MS. CHANG: The other thing that -- the focus
3 for Arizona is the employment in a macroeconomic
4 analyses. That is not done for California, primarily
5 because a majority of the spending is actually in
6 Arizona.

7 MEMBER RIGGINS: The project area.

8 MS. CHANG: The project area's in Arizona.
9 Aside from that, when it comes to the energy market
10 simulations and how it would affect California
11 ratepayers, which is different from the macroeconomic
12 analyses, we have conducted a study and has been -- and
13 has been submitted to the California regulatory
14 commission.

15 MEMBER RIGGINS: Okay. So -- and just to
16 explain sort of the logic behind my question. Reading
17 through the Chairman's exhibit for the decision by the
18 ACC in Case 130, which was the DPV2 line, they actually
19 do take into account the economic analysis, sort of an
20 imbalance for Arizona ratepayers versus California
21 ratepayers. So I just wanted to --

22 MS. CHANG: Yes, I understand.

23 MEMBER RIGGINS: Okay, thank you.

24 CHMN. CHENAL: Member Woodall had a question,
25 then we'll come to you, Member Gentles.

1 MEMBER WOODALL: Ms. Grabel, in the Palo
2 Verde Devers 2 case, the issue about the interstate
3 commerce clause did come up. It was probably faster
4 for you to write your own memo than to dredge through
5 that.

6 Mr. Amirali, are you familiar with any solar
7 thermal projects that were brought before the Line
8 Siting Committee?

9 MR. AMIRALI: I am not. I'm not familiar
10 with any particular projects, no.

11 MEMBER WOODALL: The Starwood Solar 1
12 project, which solar generation was that?

13 MR. AMIRALI: That was a solar thermal
14 project.

15 MEMBER WOODALL: And so why did you bring it
16 before the Line Siting Committee? And I'm not asking
17 you to breach any attorney-client privilege. But were
18 you informed you needed to come before the Line Siting
19 Committee for this project?

20 MR. AMIRALI: Member Woodall, I will -- the
21 Line Siting Committee process happened before I joined
22 the --

23 MEMBER WOODALL: Oh, okay.

24 MR. AMIRALI: -- before I joined Starwood,
25 but I will be more than happy to get you that

1 information.

2 MS. GRABEL: If I may interject.

3 MEMBER WOODALL: Please.

4 MS. GRABEL: I don't know the answers to why
5 Starwood might have filed it, but I actually did just
6 refresh my recollection of what the definition of a
7 plant is under the Line Siting Committee. And a
8 thermal electric plant would require a CEC application.

9 So I actually just asked Mr. Ancharski, how
10 is a solar thermal plant different than a thermal
11 electric plant; don't know the answer to that. I was
12 going to talk to my engineer friends over break. But I
13 think it's very likely that a solar thermal plant would
14 be required to come before the Committee for a CEC.

15 MEMBER HAENICHEN: I don't believe that's
16 true.

17 MS. GRABEL: I will read to you, sir, the
18 definition under the statutes. 40-360(9), the
19 definition of plant that requires to have a CEC means
20 each separate thermal electric, nuclear, or
21 hydroelectric generating unit with a nameplate rating
22 of 100 megawatts or more, and then there's a financial
23 obligation intended.

24 And so if a solar thermal plant is also a
25 thermal electric plant, and I believe, having just

1 looked at it briefly, it likely is, then somebody
2 wishing to build a solar thermal plant would be
3 required to file a CEC application.

4 CHMN. CHENAL: And that, Member Haenichen, is
5 my understanding and the understanding of the previous
6 Chair, John Foreman, who -- I think my understanding is
7 if it's photovoltaic, it's not covered by our statute;
8 if it's thermal-induced power, either by coal, by gas,
9 by thermal solar, that it is covered by our statute.
10 But I don't think that's an issue we have to decide
11 today.

12 MEMBER WOODALL: I personally do not intend
13 to prejudge any technology that might come before us,
14 so I have no articulated opinions regarding the
15 benefits, or lack thereof, with respect to this
16 technology. I just want to put that on the record for
17 me.

18 CHMN. CHENAL: All right. Member Gentles.

19 MEMBER GENTLES: Thank you, Mr. Chair.

20 So this economic analysis, does this make up,
21 basically, what in -- I forget what this -- the order
22 denying CEC, the previous order denying CEC on Page 7,
23 Number 12? So it says, "Staff testifies that Arizona
24 ratepayers would suffer a net economic loss of
25 \$242 million over the life of the line."

1 So in reading that and in looking at your
2 economic stimulus impact, does the new -- does the new
3 project compensate for that or make up that 242, or is
4 it still going to be a net economic loss? I see the
5 economic benefit; it doesn't say anything about the
6 economic loss or gain.

7 MS. CHANG: Let me -- let me first explain
8 the difference between what you're quoting in the
9 previous ACC decision and this slide. But I also would
10 like a chance to go through, I think it will become
11 clearer, the differences of the numbers you are quoting
12 and this particular slide.

13 In general, there are -- and this
14 presentation will go through the different types of
15 economic analyses. And I know -- this gets confusing
16 in many settings. What we typically do for electric
17 system is to measure if you add a project, either a
18 transmission project or a generation project, how that
19 project will affect the electric system.

20 Just forget about employment, forget about
21 who's buying the material, who are paying for the
22 material. Just put that aside completely, okay?
23 That's what this is about, so put that aside.

24 In a simulation of the electric power system,
25 we simulate -- you add -- in this case, you add the

1 transmission project and then look at what happens to
2 the power system. And I will talk about all of that.

3 The impact on ratepayers is an outcome of
4 that power system simulation, not this at all. This is
5 about -- okay. So the power system simulation I will
6 go through. And you're absolutely right, this, under
7 the current market conditions, electricity market
8 conditions, and the simulation of the future market
9 conditions, which I will also talk about, in the
10 electric system, this line will bring benefits by
11 reducing the cost of delivered electricity power to
12 Arizona ratepayers.

13 That is a significant difference between the
14 current simulation in this project versus the 2006
15 analyses and decision. And I'd like a chance to go
16 through the details of that. That is completely
17 separate from the spending. That's why I talked about
18 this as a macroeconomic analysis.

19 This is about you spend a dollar, whether
20 it's on transmission, generation, it could be on
21 streets, it could be on pipeline, it could be on any
22 infrastructure; that spending injects money into the
23 economy. And how that money is spent throughout the
24 economy, that creates value. And that value can be
25 created no matter how you inject that money into the

1 economy. That's totally separate from the electric
2 system simulation, which I will talk about separately.
3 Does that help?

4 MEMBER GENTLES: It does, thank you. And so
5 following up on Member Riggins' question about the
6 difference -- or, what's the comparison between that
7 stimulus impact on Arizona versus the stimulus impact
8 on California, and is there a net gain or loss between
9 the two or -- I think that's what -- if I read his
10 question right, I think -- which is my question, who's
11 the net benefit -- I don't want to call it winner or
12 loser, but who net benefit gains, California or
13 Arizona, as a result of this economic impact model that
14 you have --

15 MS. CHANG: Okay. Let's also talk about
16 those two things in segregated forms. From the power
17 system simulation, not that, but power system
18 simulation -- and hopefully this will address your
19 question as well -- both California and Arizona
20 benefit. And I will talk about that more -- in more
21 detail.

22 This analysis, because most of the spending
23 on the project is in Arizona, the employment will
24 happen in Arizona, this is a macroeconomic stimulus to
25 the Arizona economy. It's completely separate from the

1 power system benefits, which in this case, unlike the
2 previous ACC consideration, this provides benefit for
3 both California ratepayers and Arizona ratepayers.

4 Now, keeping in mind, California ratepayers
5 are paying for the project, even though the jobs and
6 the injection of money is mostly, not all, of course,
7 but mostly in Arizona.

8 MEMBER GENTLES: And then one final question,
9 Mr. Chair.

10 Did the Arizona Commerce Authority provide
11 any analysis on the impact, the economic impact of this
12 project, or is there anything available to take a look
13 at from the Arizona Commerce Authority?

14 And I ask that because you're saying that
15 there's significant job creation and attraction,
16 corporate attraction as a result of this project, which
17 I assume that you must have talked to Arizona Commerce
18 Authority or some other governing body here in Arizona
19 to help you with that information, right? So if that's
20 the case, then I'd certainly like to know what that
21 report says.

22 MS. CHANG: That's a very good question.
23 You're absolutely right, if we had -- if we were as
24 comprehensive as we should be, I think it would be very
25 useful to talk to the state's commerce agencies who

1 keep track of the economy in Arizona.

2 In this case, we're, I'll just say, a bit
3 academic about it. We used a model that incorporates
4 the Arizona economy as a simulation of the economy,
5 which typically takes the information from the state,
6 okay? But we, as users of that model, purchase the
7 data. I personally did not go have a conversation.

8 And you're absolutely right, if we really
9 wanted to dive into which job's going to come from
10 which segment of the economy, that detailed analysis
11 would benefit from a conversation with a commerce
12 agency of a state or for a county, for that matter.

13 CHMN. CHENAL: All right, thank you.

14 Ms. Chang, are you having fun?

15 MS. CHANG: Yeah, I'm having great fun. Are
16 you?

17 CHMN. CHENAL: Let's hold some questions for
18 a minute and let Ms. Chang get back to her
19 presentation.

20 MS. CHANG: Sure.

21 CHMN. CHENAL: And then we can ask some more
22 questions the next time we get into the
23 question-and-answer mode.

24 MS. CHANG: Yeah. No, these are good
25 questions.

1 Okay, Slide 8. Just as I started to talk
2 about cost recovery, I assume that you have already
3 gathered this through yesterday's testimony. This
4 project will be -- the cost of the project will be
5 added to the revenue requirements of all the
6 transmission projects that California ISO operates and
7 serves California ratepayers. This will be added to
8 the pool of revenue requirement in California. This
9 will not add any cost to the transmission rate base or
10 revenue requirement of Arizona. Therefore, Arizona
11 ratepayers that pay for transmission in Arizona will
12 not be -- will not be carrying the costs of this
13 project.

14 Okay, Slide 9. I'm now going into a
15 particular benefit, reducing customer cost. So
16 answering your previous question, now I'm going to dive
17 into the simulation of the electric power system.

18 Slide 10. We use a very sophisticated and
19 complex mathematical representation of the power system
20 across WECC. And WECC is really everything west of the
21 Nebraska, Kansas, Oklahoma border. All of the west is
22 one connected AC system, and we use our simulation to
23 simulate the entire WECC, and that's the term we use
24 for the entire western system. We simulated 2028 as a
25 representative year in the future, and I'll talk about

1 the scenarios.

2 Slide 11. Because typically when we do these
3 things -- because there are uncertainties about the
4 future, we simulate the future under certain scenarios.
5 In this case, we simulated three scenarios, and the
6 major differences across the scenarios are in this
7 table.

8 Scenario A contains all the resource mix --
9 and when I say "resource," we're talking about
10 generation resources -- across the WECC based on the
11 planning model that California ISO uses, but it's
12 really developed across all of the utilities in the
13 WECC system. So every utility that owns generation and
14 has load provide input into this database, which then
15 California ISO uses in its planning process.

16 We then take that as a starting point. So
17 scenario A basically has a starting point of resource
18 mix, and you'll see, focusing on Arizona, Scenario A
19 has -- I won't read all the numbers, but those are the
20 resources in Arizona in Scenario A.

21 We recognize that Scenario A contains most of
22 the integrated resource plans of the utilities in
23 Arizona, which are under some uncertainties because the
24 ACC has jurisdiction to approve those resource plans.

25 MEMBER WOODALL: Actually, acknowledge the

1 plans, acknowledge.

2 MS. CHANG: Okay, acknowledge the plans.

3 We recognize that there was -- there are
4 uncertainties. Therefore, we made assumptions that
5 adjusted the resources in Arizona, as well as some
6 other places as well, but focusing on Arizona.

7 Scenario B, we adjusted the future natural
8 gas deployment down and increased the renewable
9 generation by about 1,600. So if you look at the Row A
10 and Row B, you'll see the difference in the generation
11 resource assumptions between Scenario A and Scenario B.
12 We also added 990 megawatts of storage in Scenario B.

13 Scenario 3, everything is the same as
14 Scenario B, except that we adjusted the relative prices
15 of natural gas between California -- really for all of
16 the regions across WECC, but focusing on Arizona, the
17 relative prices -- gas prices between California and
18 Arizona.

19 So the three scenarios that we analyzed have
20 a starting point of Scenario A, adjusted the resources
21 for Scenario B, and adjusted gas prices for Scenario 3
22 -- Scenario C.

23 CHMN. CHENAL: And what's the anticipated
24 build-out period for these -- for these additional --
25 for this additional generation?

1 MS. CHANG: What do you mean by the
2 "build-out"? The time frame?

3 CHMN. CHENAL: Time frame.

4 MS. CHANG: Yeah, all of these are simulated
5 2028. So we're assuming 10 years from now what the
6 composition of the resource mix are in 2028.

7 CHMN. CHENAL: So these scenarios assume --
8 make the assumption that this is what additional
9 generation by gas and by renewable energy source will
10 exist in 10 years -- in the next 10 years?

11 MS. CHANG: Yes. Of course, these numbers
12 include existing as well. So it makes assumptions
13 about additions, as well as there are retirements, not
14 necessarily in Arizona, but in other places. So it's
15 the total megawatts in different resource types that
16 you're seeing in this slide.

17 CHMN. CHENAL: So what is it now then? What
18 is the generation capacity for natural gas and for
19 renewable generation now, so we can compare it, you
20 know...

21 MS. CHANG: That's a good question. I do not
22 have that in the slides. If you'd like, I can get
23 that.

24 CHMN. CHENAL: I'd like to have that
25 number to see what the increase is going to be by 2028

1 versus what it is today.

2 MS. CHANG: Sure.

3 CHMN. CHENAL: I think that would be helpful
4 to have.

5 MS. CHANG: Sure. Okay.

6 Just so you know, we obviously start with
7 existing, so we have those numbers, just not in the
8 presentation.

9 Okay. Slide 12 --

10 MEMBER HAENICHEN: Mr. Chairman.

11 CHMN. CHENAL: Yes, Member Haenichen.

12 MEMBER HAENICHEN: Can we go back to the
13 previous slide, please.

14 MS. CHANG: Sure.

15 MEMBER HAENICHEN: In that Arizona energy
16 storage capacity line --

17 MS. CHANG: Yes.

18 MEMBER HAENICHEN: -- vertically, what do
19 those numbers mean, 900 megawatts? Megawatts are not
20 an energy unit.

21 MS. CHANG: Good point.

22 MEMBER HAENICHEN: Do you mean 900 megawatt
23 hours, is that what you mean?

24 MS. CHANG: No. In this case, it's 990
25 megawatts. We typically, when we simulate electric

1 storage, battery storage, we assume a duration for the
2 storage. In this case, we assume it's a four-hour
3 battery. So 990 megawatts means it has a storage
4 capability of four times that in megawatt hours.

5 MEMBER HAENICHEN: Okay. Well, that wasn't
6 clear from the slide.

7 MS. CHANG: Okay, yes. Good question.

8 Okay. One of the significant impacts of Ten
9 West Link is to reduce congestion on the transmission
10 corridor. And I know we started to talk about this
11 yesterday. I want to put some numbers on the table
12 here.

13 The simulated congestion reduction of this
14 project is between 6 to \$17 million a year. Now, just
15 to give you a sense of historically, over the past
16 eight years, the Palo Verde intertie constraint has
17 averaged \$20 million a year, ranging between 8 to
18 \$37 million a year in congestion. And if you have
19 specific questions, I'm happy to answer them.

20 In a simulation, we show that in 2028 dollars
21 the congestion without the line is 12 to \$81 million
22 per year in a simulated 2028, and the line reduces that
23 congestion by 6 to \$17 million a year.

24 Now, these, just because we're throwing a lot
25 of numbers on the table, these do not directly mean

1 they are savings for Arizona ratepayers. The previous
2 numbers, and I will requote them later, those are the
3 actual savings to Arizona ratepayers. Congestion
4 really just means they're inefficiencies on the
5 electric system.

6 If we had what we call copper sheet, meaning
7 if power can flow whenever, however they want to flow,
8 we have no congestion on any of the system, then we can
9 have an efficient power system. And, of course, you
10 don't want to do that, because it costs money to build
11 infinite amount of transmission to allow power to flow.

12 And you had some questions about congestion
13 yesterday. It is similar to a highway, but it's not a
14 perfect comparison. The way congestion appears on the
15 power system basically is you have to dispatch, you
16 have to turn on a generator that's slightly more costly
17 than you otherwise would if you did not have congestion
18 on the system.

19 CHMN. CHENAL: And is that, Ms. Chang, the
20 reason for the cost? I mean, for example, over the
21 last eight years Palo Verde intertie constraint has
22 averaged 20 million per year. What does that
23 number represent, I guess? And maybe you just answered
24 it.

25 MS. CHANG: That means -- that means it's the

1 inefficiency of the transmission system that causes --
2 that we have to turn on more costly generation, instead
3 of using lower cost generation. And that cost
4 difference, really it's a price difference, but it's a
5 price difference times the amount of power that you end
6 up having to use, that's the cost to society because we
7 don't have an infinite amount of transmission, if that
8 makes sense.

9 CHMN. CHENAL: It makes sense. I'd like a
10 little more explanation maybe.

11 MS. CHANG: Okay.

12 CHMN. CHENAL: A customer in Arizona, how
13 that plays out for a customer in Arizona, for example.

14 MS. CHANG: Yeah. Maybe I can keep going and
15 then talk about the cost savings to Arizona, and maybe
16 that will help. And then I can come back to the
17 congestion question.

18 CHMN. CHENAL: Yeah, maybe you can bring it
19 back to the customer and what that congestion -- how --
20 I'm a customer. I ask for some power for my house. I
21 mean, I know it's really micro, but my house. The
22 lines are congested. The cheapest power, the
23 hydropower, is not available.

24 MS. CHANG: Correct.

25 CHMN. CHENAL: Say nuclear power would

1 otherwise be available, but it's not. And so we have
2 to get coal power from somewhere, which is maybe more
3 expensive. And therefore, what's supplying my power in
4 the middle of the summer for that peak period is coal
5 power; but if we had more efficient lines, it would
6 have been a cheaper power. And the price to me is
7 going to be the same, but the price to the APS is going
8 to be a little more maybe.

9 MS. CHANG: You got it almost exactly right.
10 So that's how the power market works. As Ali explained
11 yesterday, to efficiently operate a power system, you
12 want to turn on the least cost generator on a variable
13 cost basis first, because that's the cheapest power you
14 can purchase. And then you go up what we call a supply
15 stack or bid stack, and you turn on the more and more
16 expensive as the power needs increase.

17 Now, if there are no transmission
18 constraints, then you just go up the stack and that's
19 the most efficient outcome for the power market. But
20 because there are transmission constraints for a
21 variety of reasons, you sometimes have to not use the
22 next least expensive generator, instead turn on a more
23 expensive generator.

24 Now, it doesn't mean that the household will
25 get the coal power versus nuclear power because we

1 don't track the electrons, but it means, as a whole,
2 the market is less efficient than otherwise it could
3 be, therefore, the prices in certain areas could
4 increase or could be higher than it otherwise could be
5 if there were no constraints.

6 So when we talk about transmission
7 congestion, that's what this means. That means since
8 there's congestion, we're turning on higher cost
9 generators, when otherwise we could have used lower
10 cost generators.

11 CHMN. CHENAL: But this line really is tying
12 Palo Verde hub to California. So how -- I mean, I can
13 understand how the congestion -- how California
14 benefits from the less congestion, because more power
15 will be able to flow to California. But how does that
16 benefit Arizona?

17 MS. CHANG: Yes, good question.

18 CHMN. CHENAL: It obviously requires power
19 from California, the way I'm thinking it through.

20 MS. CHANG: You're absolutely right. The
21 congestion is in the direction of California,
22 because -- the current congestion on the system is in
23 the direction of California most of the time under
24 normal conditions. And we talk about normal conditions
25 meaning most of the lines are online, the generators

1 are not disrupted. So under normal conditions, most of
2 the time congestion between Arizona and California is
3 in the direction toward California.

4 And why? Because we've built the system that
5 way, right? We built Palo Verde in Arizona, we built
6 transmission to deliver that power to California way
7 long ago, history. The whole power system is set up in
8 that way. It's mostly constrained in the west
9 direction.

10 So this line does provide another path,
11 increasing the potential transfers, and therefore
12 reduce the congestion in the westward system, that is
13 true. However, this line also boosts the reliability
14 of the entire, I'll just call it the southwest system.

15 It also, by relieving congestion -- you asked
16 what is it for Arizona. The generator is physically
17 located in Arizona. Arizona can now have more
18 opportunity to sell to California. And it turns out,
19 as we simulated the power system, with the line when
20 they sell, the prices are actually higher than without
21 the line. This means that now the profit of the
22 generators in Arizona increases because of the line.

23 When you have a regulated utility owning
24 generation or contracted generation, they can sell
25 power at a higher cost, that reduces the cost that

1 ratepayers in Arizona must bear for the generation in
2 Arizona. That's how, when we talk about increasing
3 market value of generation in Arizona, that's what we
4 mean.

5 When we are selling, when you're a net seller
6 into the market, the prices are actually slightly
7 higher because of this line. And when you're buying
8 power, it turns out this line enables, because of the
9 power flow, the way the power flows, the prices are
10 actually slightly lower when Arizona is buying power
11 from California.

12 CHMN. CHENAL: Yes, and thank you. I
13 understand that explanation. I'm going to ask, as we
14 go through the presentation, that -- I mean, a lot of
15 this is conclusory.

16 MS. CHANG: Yes.

17 CHMN. CHENAL: It's not a criticism; it's
18 just very conclusory. I would appreciate the
19 explanation so that I can understand that better as we
20 go through.

21 MS. CHANG: Sure.

22 CHMN. CHENAL: For example, the discussion
23 that we just had --

24 MS. CHANG: Yes.

25 CHMN. CHENAL: -- it would be helpful if you

1 explain that as we go through.

2 Member Haenichen.

3 MEMBER HAENICHEN: Thank you.

4 The comments just made by Ms. Chang
5 demonstrate the genesis of my questions yesterday
6 about -- on the existing transmission from east to west
7 that exists right now, what percentage of the flow is
8 going to California on a yearly basis versus here? And
9 I didn't hear an answer to that yet. You were going to
10 gather that. Have you worked on that?

11 MS. GRABEL: Actually, Member Haenichen, I
12 was going to talk to you a little bit offline about
13 it. Some of the information you requested is
14 confidential. But it's very helpful to hear your
15 explanation for what exactly you would like us to get
16 for you.

17 MEMBER HAENICHEN: Well, if it's
18 confidential, that really surprises me.

19 MS. CHANG: Well, let me also just open that
20 up. I did hear your request, and I would really very
21 much like to understand how the flow information might
22 help inform your decision. And I'm going to try -- I
23 would like a chance to answer your questions regarding
24 the flows.

25 And the reason I'm saying that is, we look at

1 simulated flows or actual flows all the time. It is --
2 it is so much data, hourly data across -- it's not just
3 single lines, because that's not how the power system
4 works. It would have to be across multiple lines, they
5 make a path.

6 And so I'd like to be able to answer your
7 question and help gather the data, if they're
8 available, to answer -- to be informative. Because
9 otherwise, you get gigabytes of data; I'm not sure how
10 that would help inform your decision. So if you can
11 help me understand what you're asking, perhaps I can
12 help by answering it in a more conceptual, and then we
13 can try to find the data that you'd like to get.

14 MEMBER HAENICHEN: Well, my concern is simply
15 this. If this line is built, we have no idea where the
16 generation is going to come from and what kind of
17 generation it's going to be. We can talk about the
18 great future coming 50 years from now when everything
19 is solar photovoltaic and the storage problem has been
20 solved, but those are not realities today.

21 So I'm concerned that we're going to wind up
22 with more thermal generation being built in Arizona to
23 service this line; and from your comments a moment ago,
24 I think we're going to find that almost all of the
25 energy is going to flow east to west. You implied that

1 with what you said.

2 So that is something that I think would be
3 harmful to Arizona. Because if it's thermal
4 generation, we have to use enormous amounts of scarce
5 water to generate that. In fact, for this line, if it
6 was full all the time going from east to west, it would
7 be over 10 billion gallons of water a year, which we
8 can ill afford because we're shrinking, our supply is
9 shrinking all the time, as I'm sure is California's.
10 Those are my concerns.

11 MS. CHANG: Okay.

12 MR. AMIRALI: Member Haenichen, may I just
13 reiterate. First, any thermal projects that are built
14 over a significant size will come in front of your
15 Committee, sir.

16 And second, thermal projects do have the
17 capability of building a dry project. They don't
18 need -- none of them -- not all of them require water
19 cooling. They can be dry cooled. In fact, those are
20 the -- like any project that were proposed even, I
21 would say, post 2002, were all dry cooled in the
22 southwest, and they have to acquire water and seek
23 permits from you. So Arizona has the capability of
24 controlling their future on that front.

25 Second, the reality remains -- the reality

1 is, as we sit today and as we forecast going forward,
2 our queue, if you can check Arizona APS's queue, as
3 well as -- not just the ones that are impacted by this
4 project, but overall APS queue, SRP queue, almost -- a
5 large portion, a majority of the projects that are
6 being proposed in Arizona, California, and even Nevada
7 are all solar PV projects with storage.

8 All of California, New Mexico has already
9 determined that they would have a carbon-free footprint
10 by 2045 to -- before 2050. APS just announced a
11 similar target yesterday. And that is the reality that
12 we are dealing with. We are dealing with a
13 carbon-free -- a carbon-free future that we are looking
14 at.

15 So as we sit here today and extrapolate the
16 reality that we will be facing going forward, we are
17 looking at a more carbon-free -- more carbon-free
18 projects that do not employ any kind of fossil fuels,
19 and that's all we can foresee right now.

20 MEMBER HAENICHEN: Well, if that's true, then
21 I'm wondering why this project isn't being proposed to
22 be built in California instead.

23 MS. CHANG: Yeah, let me also supplement by
24 explaining perhaps how the world has changed since the
25 2006, 2007 decision about DPV2.

1 One, I think across the west there's
2 significant interest in renewable energy, not just
3 because of policy, as you know, some policies are
4 driving the development of renewable energy, but
5 because renewable energy costs have come down. So
6 really, across the west utilities, even if not
7 completely subject to mandates, customers, which are --
8 who are looking at renewable as their fuel of the
9 future to power their systems and their operations, are
10 all focusing on renewable energy. So that's one big
11 difference between back in 2006 and '7 and today.

12 As Ali had said, California now has a carbon
13 price. So any imports of gas thermal, never mind coal,
14 but gas thermal, will have to pay a carbon emissions
15 charge to be imported into California. So I don't
16 think for imports into California it's attractive today
17 or in the foreseeable future to build more gas plants
18 for importing into California.

19 So I think you should rest -- I don't know --
20 be more comfortable with the fact that this line is not
21 going to induce gas generation to be imported into
22 California.

23 MEMBER HAENICHEN: Well, that doesn't really
24 answer the last question I had, and that is: Why,
25 then, isn't California building these facilities?

1 MS. CHANG: Right. So there are two other
2 factors that are significantly different between now
3 and back in 2007. One is, as you know, there's an
4 energy imbalance market, and that has been in operation
5 since 2014 or '15. And most of the utilities
6 participating in that are gaining experience of how to
7 use the market to transact short-term energy in that
8 imbalance market. And they're learning that
9 transmission capabilities, increasing transmission
10 capabilities give them a lot more control to buy and
11 sell on the short-term market.

12 I know that doesn't answer your question yet.

13 MEMBER HAENICHEN: It doesn't, no.

14 MS. CHANG: Okay. But it does increase the
15 learnings from utilities to rely on a larger system for
16 all of their needs, instead of just building locally to
17 serve locally.

18 Back to your question about why California is
19 not just building the solar inside California. They
20 are doing that. In fact, they're doing that more than
21 Arizona. Which is why, when we simulate 2028, we're
22 seeing, during the solar period, Arizona is buying this
23 power at very low cost. Not buying, but the power just
24 flows to Arizona because of the way the power system
25 works, it suppresses the prices in Arizona to the

1 benefit of ratepayers in Arizona.

2 So they are building in California, they're
3 building more than they can -- the system can actually
4 handle imbalance -- not handle -- but the system is
5 trying to build itself up to manage the balancing of
6 the solar resources in California. So they are
7 building locally. This is in addition to what they're
8 building locally.

9 MEMBER HAENICHEN: Then I'll reserve my
10 further comments until I see what the current flows are
11 in the lines that exist now, and I'm hopeful that will
12 come soon.

13 CHMN. CHENAL: A quick question from Member
14 Palmer, then I think we'll take our break.

15 MS. CHANG: Okay.

16 MEMBER PALMER: I think Ms. Chang just
17 answered my question. But my recollection, and I
18 wanted to confirm that, was yesterday we heard
19 testimony, I think from Mr. Amirali, that -- and I
20 think Ms. Chang just addressed this.

21 There were opportunities and there were
22 short-term windows when Arizona was actually -- had the
23 ability to buy power at next to nothing, if not
24 negative rates, to get power off the system that was
25 being generated --

1 MS. CHANG: Correct.

2 MEMBER PALMER: -- elsewhere.

3 MS. CHANG: Correct.

4 MEMBER PALMER: Do I remember that right?

5 And what I understood was that was why this line
6 differed from the previous iteration of this, the DPV2
7 line. I just wanted to clarify if that's what I
8 remembered hearing yesterday.

9 MS. CHANG: Yes, that's absolutely right.
10 You'll see in a later slide that because of the
11 abundance of solar generation in California, when sun
12 is shining the prices are actually lower with this line
13 in Arizona, so that ratepayers are benefiting by buying
14 lower cost resources from California and elsewhere, but
15 primarily California.

16 MEMBER PALMER: Thank you.

17 MS. GRABEL: Ms. Chang, that's actually your
18 next slide, if you just want to show him for
19 illustration purposes.

20 MS. CHANG: Oh, yes. This is the slide on
21 the right-hand side. I know it's a lot of graphics.
22 But the lower right graph, the light blue shows the net
23 purchases from Arizona utilities, and the dark blue
24 line shows the change in the prices during which
25 Arizona utilities are buying.

1 So you can see that during the middle of the
2 day, when the sun is shining, Arizona is buying a
3 significant amount; and because of the line, the prices
4 actually decrease by, on average, about 50 cents during
5 the sunny times of the day.

6 And then in the offpeak or nighttime, Arizona
7 is actually selling more generation to outside of
8 Arizona. During -- because of the line, the prices are
9 slightly higher during the time that Arizona generators
10 are selling because of this line. So that's why we
11 show an increase in market value of generation in
12 Arizona.

13 CHMN. CHENAL: All right. Let's take our
14 morning break and come back to this, Ms. Chang, when
15 we're fresh. I'd like to look at it and study it and
16 maybe have some questions on it. So let's take a
17 15-minute break. Thank you.

18 (Off the record from 10:56 a.m. to 11:23 a.m.)

19 CHMN. CHENAL: All right. Are we ready to
20 resume the morning session? Are there any matters we
21 should discuss before we get back to the testimony?

22 MS. GRABEL: I have none.

23 CHMN. CHENAL: Okay. Then, Ms. Chang, when
24 you're ready, we'll resume with your testimony and the
25 slide that you left when we broke.

1 MS. CHANG: Great, thank you.

2 CHMN. CHENAL: Thank you.

3 MS. CHANG: Slide 13, we paused here. There
4 are two diagrams on Slide 13. The upper right corner
5 shows the customer cost impact of Ten West Link. This
6 gets to the answer of a previous question. When we
7 simulated the power system, we show that overall
8 ratepayers in Arizona will actually experience a
9 decrease in the cost of delivered electric energy to
10 Arizona, and the different scenarios have these
11 conclusions. And you're right, these are the
12 conclusions of the simulation of 2028.

13 The way it's -- the reason this happens is
14 shown in -- or, summarized in the diagram on the lower
15 right-hand side. Arizona purchases power, Arizona
16 utilities purchases power, this is an average hourly
17 for the year. The light blue bars show the amount of
18 purchases by Arizona utilities, and the dark blue line
19 shows the prices. But it's the difference in the price
20 with the line versus without the line.

21 So when it's below the origin, it shows that
22 the prices decrease, and above the origin it shows the
23 prices increase. And the price increased slightly,
24 less than 50 cents per megawatt hour, during the
25 shoulder periods and the offpeak periods, so the hours

1 where the sun is not shining. Whereas when the sun is
2 shining during the middle of the day, the prices
3 decrease as Arizona purchases more power from the
4 market.

5 I'm going to keep going, and then we can
6 always come back to some of these other questions that
7 you might have. Slide 14 talks about regional benefits
8 of Ten West Link. The conclusion here is that, in
9 addition to the benefits specific to Arizona, this line
10 also decreases system-wide costs. That means it
11 increases the efficiency of the entire power system
12 across the west, and it decreases the system cost by 25
13 to \$54 million a year. In addition, it has a slight
14 effect on losses. So WECC-wide, we also see a
15 reduction in losses.

16 I'm going to keep going. On Slide 15 we're
17 going to move into the next section, which is access to
18 clean energy resources from a regional perspective and
19 Arizona's role in that.

20 As you already heard me talk about, the west
21 really has changed dramatically and will continue to
22 move in this direction. There's a significant reliance
23 on renewable generation across the west. And that
24 means that any flexibility we can add to the system,
25 and I'll define flexibility for you, any flexibility we

1 can add to the system will be beneficial to all the
2 systems that rely on renewable energy generation.

3 As you have heard about the duck curve of
4 California, about the intermittency of wind and solar
5 resources, what that means is our current system is not
6 built necessarily to accommodate all of these
7 intermittent resources added on to the system.

8 As we add more and more -- and when we say
9 "us," not just Arizona, but across the west. Not just
10 California, not just Arizona, but really across the
11 west. As you heard, APS has committed to clean energy
12 by 2045, and other utilities in other states have made
13 certain commitments. This means we're going to be
14 relying more and more on clean energy, not just --
15 including wind and solar.

16 That also means that more flexibility --
17 flexibility would have increasing value on the system.
18 And where do we get flexibility? We get flexibility
19 from -- sometimes you hear about storage. Storage can
20 ramp up and down quickly, that provides flexibility.
21 We get flexibility from transmission systems. And this
22 is significant because it's difficult to value and put
23 a dollar on it. But we know that as we expand transfer
24 capabilities across the system, we add flexibility to
25 the system.

1 Just to give you a very concrete example on
2 flexibility. When you add transfer capability, you now
3 can have more flexibility in maintaining and operating
4 the rest of the system. Sometimes you have to take
5 generation and transmission offline for conducting
6 maintenance. The more robust the system is, the more
7 flexibility you have in conducting maintenance and
8 operations.

9 There is flexibility on an hour-to-hour or a
10 second-to-second basis. That means the more resources
11 on the system that can ramp up and down to coordinate
12 better between load and generation, the more reliable
13 the system is. So this line not only increases and
14 meets the need of Arizona from a cost perspective, from
15 an access to clean energy perspective, but also from a
16 reliability and flexibility perspective.

17 This slide talks about facilitating
18 interconnecting new solar and solar plus storage
19 resources in Arizona. I know we talked about this
20 before, but I certainly can elaborate even more. It
21 also expands regional access to a diverse supply of
22 low-cost clean energy. So this provides additional
23 access for Arizona to clean energy resources outside of
24 Arizona.

25 CHMN. CHENAL: Are we on the right -- we're

1 looking at Slide 16 up on the screen.

2 MS. CHANG: I am on 16, yes. I'm still on
3 16.

4 It also enables -- am I not right? This is
5 right. Okay.

6 Slide 16 enables opportunity for regional
7 coordination. I might have gone off script when I
8 talked about flexibility. I am coming back to the
9 slide. Enables opportunity for regional coordination
10 as well by increasing transfer capability.

11 To me, because -- the reason I dove off and
12 talked about flexibility is because these are all
13 interlinked topics that are very much related. When I
14 think about adding renewable resources and access to
15 clean energy, we're also talking about how flexible the
16 system is in accommodating these renewable energy.

17 Next slide, 17, this talks more about the
18 4,000 megawatt of solar interconnecting -- requesting
19 interconnection with California ISO and the 900
20 megawatt of solar plus storage in the APS queue.
21 Again, Ten West Link enables by adding transmission
22 infrastructure that allows additional interconnection
23 that's desired by these resources.

24 CHMN. CHENAL: Yes, Member Woodall.

25 MEMBER WOODALL: I looked at your very

1 well-written report, which is an exhibit to this
2 matter, and I saw that you had a combination of about
3 4,000 megawatts both for APS and for this particular
4 project. And I know we have the queues that shows the
5 number of projects that have requested connection to
6 this line.

7 But what I want to know, because it just
8 isn't clear to me, can you give me a precise megawatt
9 number that you used as the basis for your other
10 calculations here? And I'm referring to the power
11 ones. I mean, did you use -- you said you used half of
12 that. So did you use 4,000 or did you use 2,000 or...

13 MS. CHANG: No, actually, there are two
14 assumptions. You're very thorough in your analyses.
15 So on Slide 11 --

16 MEMBER WOODALL: Okay.

17 MS. CHANG: Should I...

18 MEMBER WOODALL: No, no. Because I may be
19 the only one that cares.

20 MS. CHANG: Yes. So on Slide 11 it shows you
21 the renewable generation capacity added -- included in
22 the system for the 2028 simulation. So you'll see,
23 again, in Scenario 1 it's 1,600, Scenario B is 3,200,
24 and Scenario C is 3,200.

25 Now, it is related to the interconnection

1 request, but we didn't take specific projects -- we
2 considered the interconnection queue and then we made a
3 judgment based on the IRPs, the resource plans that the
4 utilities filed, and considered what is likely to shift
5 from gas generation to renewable plus storage
6 generation.

7 MEMBER WOODALL: And obviously, your analysis
8 could not take into account the recent announcement by
9 APS?

10 MS. CHANG: No.

11 MEMBER WOODALL: Okay. And so the IRP plans
12 that you reviewed were probably from what year?

13 MS. CHANG: 2019.

14 MEMBER WOODALL: Okay. Did they file some?

15 MS. CHANG: 2019 was the APS IRP, I mean,
16 subject to check. And there was a reaction from the
17 ACC in 2019, I believe, which suggested that less gas
18 should be deployed in the future and more renewables
19 should be deployed in the future. So we took that into
20 consideration in simulating the future scenarios, as
21 you saw on Slide 11.

22 MEMBER WOODALL: Thank you.

23 MS. CHANG: Yeah. So you are right in the
24 sense that we didn't take the precise numbers of
25 megawatts and then did the macroeconomic. We took the

1 interconnection queue and sliced it in half and said,
2 well, the macroeconomic stimulus is more associated --
3 you know, half of what's requesting will be likely to
4 be built.

5 MEMBER WOODALL: And just perhaps Staff could
6 tell us, at some point, when they anticipate the final
7 IRPs to be filed by the utilities. That would be
8 helpful for me to know that. Because the one you're
9 working on is -- I would just like to see it, that's
10 all. I would just like to know from Staff when the
11 April 1 is going to be filed.

12 MS. CHANG: Okay, I stand corrected. The IRP
13 is 2017.

14 MEMBER WOODALL: That's what I thought.

15 MS. CHANG: Yeah. For some reason, the
16 reaction might have come in 2019, or maybe --

17 MEMBER WOODALL: There was some excitement,
18 no doubt about it, they were not acknowledged. But
19 anyway, thank you so much. I appreciate that. I
20 appreciate your clarifying it. And I don't have any
21 other questions on that topic. Thank you very much,
22 ma'am.

23 MS. CHANG: Okay. Back to Slide -- now
24 moving on to Slide 18. The next three slides talk
25 about regional and regional markets. Ten West Link

1 increases the operational flexibility. I know I kind
2 of went off tangent earlier, but this is, in my mind,
3 very much related to the renewable generation that's
4 being added across the west.

5 Ten West Link definitely increases the
6 operational flexibility on the system, and therefore
7 helps Arizona integrate additional resources as well,
8 because it gives them -- think of it as -- perhaps an
9 earlier analogy would work here.

10 Think about a basin of water, and you just
11 have much more valves to sort of allow the power in and
12 out flow. Now, the difference is we're not controlling
13 the valves in this case. But because of the balance of
14 the system, the more transmission capability allows the
15 system to have more flexibility to balance the system,
16 and that also provides benefits to Arizona as it adds
17 renewable energy resources onto its system and/or
18 purchases resources from outside the system.

19 So overall, from a regional or subregional
20 perspective, this line adds to the reliability of the
21 system and adds to the flexibility of the system.

22 CHMN. CHENAL: Member Woodall.

23 MEMBER WOODALL: I've asked this question
24 before, but doesn't any extra high voltage line that's
25 added to the western interconnection make the system

1 more reliable? I mean, it's sort of like a given, is
2 it not?

3 MS. CHANG: Well, I wouldn't say any line.

4 MEMBER WOODALL: Most. Well, you qualify it
5 however you want.

6 MS. CHANG: Yeah, I do think we do need to be
7 very cautious -- again, this is a more generic and
8 global comment. I do think we need to be careful about
9 how we spend money on transmission, okay. It's not a
10 -- it is a significant infrastructure investment. As
11 you saw yesterday, significant access to rights-of-way
12 that are difficult to come by.

13 So I do think as we explore what transmission
14 systems need to be upgraded or enhanced across the
15 west, we need to be cautious and think about the
16 future. And part of the reason we're simulating the
17 future under different scenarios is to show you the
18 benefit of this project cuts across different future
19 scenarios. I don't think every particular project will
20 have positive benefit-to-cost ratio, so it's not just
21 any line you add will have a positive benefit-cost
22 ratio.

23 MEMBER WOODALL: No, I was just talking about
24 electrical reliability. I asked an engineer once, I
25 said, can you -- I mean, doesn't every extra high

1 voltage line add some reliability to the system? And
2 the answer was yes. And so -- but I appreciate you're
3 giving me a more nuanced response and you're taking
4 into account, but that doesn't mean every extra high
5 voltage line is prudent or --

6 MS. CHANG: Correct.

7 MEMBER WOODALL: -- an effective use of
8 resources and market. But I'm just talking about the
9 electrical system. The more big lines you have in the
10 air, doesn't that add to reliability in general? And
11 if it doesn't, that's fine.

12 MS. CHANG: It could, I'll just say.

13 MEMBER WOODALL: Good word. Thank you.

14 MS. CHANG: Okay. Slide 19. We put this
15 slide together because, as you probably anticipate, the
16 solar irradiance are very similar between southern
17 California and Arizona. So we typically think they are
18 well coordinated or correlated in the output of the
19 solar resources.

20 CHMN. CHENAL: And Ms. Chang, what is
21 irradiance?

22 MS. CHANG: It's just the sunlight that's
23 used to produce power in the -- power the photovoltaic
24 system.

25 CHMN. CHENAL: Thank you.

1 MS. CHANG: This is a slide that shows you,
2 there is some diversity value because some -- because
3 solar system is very sensitive to local cloud covers,
4 even though you don't have a lot of cloud covers here,
5 there are cloud covers once in a while. So there are
6 diversity value as well just purely on the solar system
7 across the border.

8 You asked earlier why California doesn't just
9 build solar in their own territory; and they do, and
10 they're building a lot of that. And so the correlation
11 between the solar power that's produced is an important
12 factor to consider, and there is some diversity value
13 between California and -- Southern California and
14 Arizona.

15 The next slide, I think, is quite important,
16 because this gets into another factor that's
17 significantly different today. I mentioned earlier
18 since 2014 or 2015 the EIM market has been in
19 operation. APS currently is a member, and SRP will be
20 a member this year and TEP will be a member in 2022.

21 CHMN. CHENAL: Could you -- excuse me,
22 Ms. Chang. Could you explain a little more about what
23 the EIM is, energy imbalance market?

24 MS. CHANG: Sure, absolutely.

25 Earlier I explained that power plants are

1 dispatched from an economic basis. The cheapest cost
2 resources are dispatched first so that you get the
3 lowest cost resources, and you go up the supply stack
4 and then you use more and more expensive resources.

5 Well, it turns out you can do that very well,
6 except there are sudden changes in what we call
7 realtime, meaning there could be all of a sudden, you
8 know, a heat wave comes unanticipated and people are
9 turning up their ACs or the ACs automatically turn up.

10 So there are what we call imbalances. And
11 the reason it's called imbalances is because it's what
12 you anticipate typically in a day ahead -- so 24 hours
13 before you anticipate how much power is needed, you're
14 dispatching the power plan to CAISO or APS. They do
15 the same thing, or similarly, they dispatch the
16 generation on the system from the most economic basis
17 and then go up the supply stack.

18 But at the last minute, close to the
19 realtime, so in this moment you turn on your lights,
20 you want to make sure the lights come on in a balanced
21 way. There is what we -- they have created an
22 imbalanced market, where it basically rebalances the
23 system and changes the up and down on all the power
24 plants. This is all automatic; it's not manual. But
25 there are systems, in this case operated by the CAISO

1 system operator, to kind of balance the system on the
2 last minute.

3 And why this is important and why this is
4 welcome by many utilities across the west is, for the
5 first time, the utilities across the west are using
6 this last-minute imbalance market to buy and sell
7 across the borders, so to speak, or interfaces without
8 having to pay a transmission charge.

9 Okay. Taking away this transmission charge,
10 because that adds another factor or variable into this,
11 it basically allows the systems to balance themselves
12 at the last minute using neighboring systems, okay.
13 APS has always done this for itself, obviously, because
14 the lights stay on and the system is balanced at all
15 times.

16 But now with the imbalance market, APS and
17 the other utilities in the EIM can use neighboring
18 systems to balance its own system, just like California
19 can now rely on APS to help balance the system. So
20 this is a very useful tool for the marketplace for the
21 reliability of the system and for efficiency.

22 So all of a sudden you don't have to turn on
23 that, you know, peaker that's very expensive in Arizona
24 because all of a sudden there's a heat wave, you now
25 have -- you know, unanticipated way you have to now

1 turn on the peaker at the last minute. You can go to
2 this market and just buy more resources, if they're
3 available, and if they're cheaper than turning on the
4 peaker. So essentially, the imbalance market works
5 that way.

6 CHMN. CHENAL: And what's the -- is it a
7 geographic range of the EIM? I mean, what is that --
8 how large is this market?

9 MS. CHANG: Oh, that's a good question. It
10 is a geographic participation that includes all the way
11 from the Pacific Corridor up in Oregon, Washington down
12 to Arizona, and there are bits and -- actually, it
13 starts in Vancouver, because Powerex, BC Hydro also
14 participates in the EIM. So it goes from Vancouver,
15 all the way down to Arizona. Parts of different
16 utilities are participating in the EIM, and more and
17 more members are participating in the EIM because they
18 see the benefits of participating in this market.

19 And just one more note. The reason this is
20 important for Ten West Link is Ten West Link adds to
21 the capability of this market. It increases the
22 transfer capability between -- let's just call it
23 Arizona to the outside. Because really the way
24 transmission network works is not just A to B, it's
25 really A to the outside.

1 This increases the transfer capability in
2 both directions for the EIM. So all the participants
3 in EIM, including Arizona utilities, will benefit from
4 having greater access to the power transfers between
5 itself and the outside.

6 CHMN. CHENAL: And does congestion enter into
7 this analysis as well? I mean, is it helpful to add
8 this line to reduce the congestion, which therefore
9 increases the spot market or the --

10 MS. CHANG: Yes.

11 CHMN. CHENAL: -- imbalance market, the
12 transferability of power?

13 MS. CHANG: Yes. The short answer is, yes.
14 Any reduction in congestion affects both the day-ahead
15 and realtime market. So addition -- adding transfer
16 capability relieves congestion in day-ahead mostly,
17 because that's how the market operates, but also in the
18 realtime.

19 CHMN. CHENAL: Member Woodall.

20 MEMBER WOODALL: Could you explain to me the
21 difference between an organized market and a
22 non-organized -- I don't want to say a non-organized or
23 disorganized. But in Arizona my understanding is
24 there's a lot of bilateral contracts.

25 MS. CHANG: Correct.

1 MEMBER WOODALL: So could you explain the
2 difference between those markets in California and what
3 we have in Arizona?

4 MS. CHANG: Sure.

5 MEMBER WOODALL: Because you were talking
6 about it expands the market, and I'm just trying to
7 understand how that would relate to bilateral contracts
8 that are here in Arizona.

9 MS. CHANG: You're absolutely right.
10 Currently -- putting aside EIM, okay. EIM is a
11 imbalance, short-term, last-minute market for now.

12 Until EIM started, California is what we
13 typically call a centralized organized market. That
14 means, as Ali pointed out yesterday, California is
15 taking the position -- let me put it the other way.

16 APS today, if they want to buy power, they go
17 to the bilateral market, that means they go to sellers
18 and buyers and transact on a bilateral basis. They
19 usually do that, of course, ahead of time, so that they
20 have a contractual relationship with an entity or many
21 entities. And they have to secure transmission, so
22 that whatever they buy and sell have the transfer
23 capability or transmission capability to allow the
24 power to flow.

25 And most of the west outside of California

1 operates that way today. Okay, putting aside EIM.
2 That's how it operates today. So if you go to
3 Colorado, you know, Public Service Colorado does
4 exactly the same thing. It goes to the neighbors, buys
5 and sells on a bilateral basis to secure transmission
6 to allow that power to flow.

7 When we talk about centralized organized
8 market, we're basically taking the buy and sell and
9 transmission operations function, among other
10 functions, to the CAISO. CAISO, among other functions,
11 operates the system by dispatching in their spot
12 market, which gives you a transparent price. Because
13 remember, the bilateral market does not have a
14 transparent price. You enter into a bilateral contract
15 with, let's say, APS with PacifiCorp, nobody knows how
16 much you transacted for. That's bilateral market.

17 An organized centralized market has and will
18 publish day-ahead and realtime prices on a -- the
19 market actually clears on a 15-minute basis, but they
20 will publish hourly prices.

21 Now, against that prices you can basically
22 still enter into bilateral contracts, but you see, if
23 you didn't enter into a bilateral contract, how much
24 you would have to pay -- how much you pay and buy --
25 how much you would pay to buy and sell and get paid for

1 power.

2 MEMBER WOODALL: So does CAISO set these
3 prices?

4 MS. CHANG: The CAISO has a system that sets
5 the prices.

6 MEMBER WOODALL: Yes, that's what I meant.

7 MS. CHANG: California ISO does not manually
8 set any prices.

9 MEMBER WOODALL: Of course.

10 MS. CHANG: The prices are set -- remember,
11 we talked about the supply stack. We start with the
12 cheapest cost resources. They bid into this market.
13 Typically, in a competitive market, they're bidding
14 their variable cost.

15 They bid into their variable cost -- say I'm
16 going to sell my power at \$15, and the next generator
17 sells at \$20. The market clears the lowest cost until
18 all load is met. Let's say the clearing price is \$30.
19 We call the unit that sets that price as the marginal
20 unit, because that resource sets the price for the
21 entire market. The entire market clears at, let's call
22 it, \$30. So everybody that -- putting aside
23 constraints, everybody that buys and sells in that
24 moment pays \$30 to buy and receives \$30 if you get --
25 if you sold.

1 MEMBER WOODALL: Does CAISO have firm
2 transmission, and you could probably explain what that
3 is, and does Arizona have firm transmission? If you
4 could explain the difference, I think that might be
5 helpful, to me anyway.

6 MS. CHANG: Yes. Firm and non-firm
7 transmission is a term used in the FERC open access
8 transmission tariff, okay. Firm means that if you
9 secure -- usually, it means, in a bilateral market,
10 you're securing transmission rights. And those rights,
11 once you pay for it, they are there for you to use and
12 it's firm. That means it's available when you use it.

13 Typically, we no longer use firm versus
14 non-firm in an organized, centrally organized power
15 market that's operated by CAISO. And why do we not do
16 that? Because you no longer need to secure
17 point-to-point, as Ali said yesterday, point-to-point
18 transmission, like I want to sell power here, someone
19 is going to take power there. There's no more such
20 things in a centrally organized market.

21 Everybody bids, the generators bid. The
22 operator, in this case CAISO, balances the system,
23 makes sure it doesn't violate any constraints on the
24 transmission system. So there's no longer a concept of
25 firm transmission. Meaning I'm a generator, I no

1 longer have to buy firm transmission rights to flow my
2 power. I just bid my generation.

3 MEMBER WOODALL: So there are costs, I'm
4 assuming, for firm transmission.

5 MS. CHANG: Correct.

6 MEMBER WOODALL: Okay. And so in Arizona,
7 one would have to pay --

8 MS. CHANG: Yes.

9 MEMBER WOODALL: -- say APS, I want firm
10 transmission of so many megawatts for however so long.
11 You could not do that in the CAISO market? It doesn't
12 sound like it, but I'm not sure.

13 MS. CHANG: Yes. So backing up a little bit.
14 Yes, you're right. If I want to flow -- if I'm a
15 generator sitting on APS system, and I want my power to
16 flow to California, I have to secure transmission
17 rights, and I have to pay APS, who happens to be the
18 transmission owner, the cost of that transmission.

19 There's no such thing -- if I want to flow
20 power from, let's say, Southern California Edison's
21 portion to PG&E's portion, you don't pay transmission
22 in the same way I just described. However, if I am a
23 generator in California, and I am securing to sell on a
24 long-term basis to Arizona, as I exit California I am
25 paying an exit fee to leave California.

1 MEMBER WOODALL: I was just thinking -- and I
2 don't know anything about the market. But I was just
3 thinking, if you have solar plants in Arizona and they
4 want to sell their power to, say, APS or somebody in
5 the Arizona market, and they want firm transmission --
6 and I'm not saying it would be logical that they would
7 want that -- they're going to have to -- they pay that,
8 and they get the use of that line. Nobody else is
9 telling them what needs to be dispatched. They have
10 purchased the rights to use that line, is that --
11 obviously, I'm oversimplifying.

12 MS. CHANG: In Arizona -- I'm sorry. Your
13 question is, if a generator in Arizona, a merchant --

14 MEMBER WOODALL: Yes.

15 MS. CHANG: -- generator in Arizona wants to
16 sell to APS, for example, do they have to secure
17 transmission rights? Is that your question?

18 MEMBER WOODALL: Or someone else. I mean, I
19 realize that a lot of times the price is to APS. But
20 I'm just trying to distinguish between, is it more
21 advantageous for someone developing generation in
22 Arizona to have firm transmission, than it would be if
23 they were connected to the CAISO? That's what I'm
24 trying to determine. And you can dumb that down for me
25 as much as you would like.

1 MS. CHANG: Well, let me just say this. If
2 I'm a merchant generator in -- if I'm a merchant
3 generator in Arizona, and I know the reason I'm
4 building this plant is because APS is going to use it
5 to satisfy their, say, clean energy goals, I become --
6 this is complicated again -- I become a resource to
7 APS, okay. They sign a long-term contract and things
8 like that.

9 MEMBER WOODALL: Yes.

10 MS. CHANG: APS then has what we call network
11 service transmission service. And I, as a generator,
12 don't pay for transmission to deliver to APS, because
13 now I am declared as APS resource, they pay me for
14 this, APS owns the transmission, and the ratepayers of
15 APS pays for the transmission, and I just have access
16 to the network service of transmission.

17 MEMBER WOODALL: Okay, thank you. That
18 explained that extremely well for me. Thank you so
19 much.

20 I don't know if Mr. Amirali...

21 MR. AMIRALI: Ma'am, I just wanted to add
22 that typically for projects that are signing long-term
23 agreements with a utility in a vertically integrated or
24 an APS-type of a market or bilateral market, the point
25 of delivery of the generation is the key component of

1 whether the generation owner has to buy for
2 transmission or not.

3 What we have seen recently on all the RFPs
4 that have come out by APS lately, and you know, you
5 have seen all of the -- all the procurements that they
6 have done lately on solar and storage projects, they --
7 the point of transaction, a change of ownership of
8 energy, is the busbar and the generation busbar. That
9 means that the resource -- that APS is bringing the
10 transmission to the deal.

11 MEMBER WOODALL: Let's assume, though, that
12 the off-taker is in New Mexico from a solar plant, and
13 they want to have that because they're afraid their
14 windmills are going to stop. They're not going to be
15 part of CAISO. Can they, then, get -- and let's say
16 it's being sold to PNM or something, which is a utility
17 in New Mexico. Could they get firm transmission then?

18 MS. CHANG: Yes, and they have to. They have
19 to exit Arizona's utility service territory, pay an
20 exit fee, basically, that's a transmission charge, to
21 sell to New Mexico.

22 MEMBER WOODALL: The reason I'm asking these
23 questions is, you know, I've heard before there's a
24 concern that somehow Arizona is going to be treated
25 unfairly or generators or whatever in the CAISO market

1 because they're the ones establishing or setting
2 prices, in accordance with your description, and
3 they're going to be determining -- what I'm saying is,
4 I've heard that articulated, and so I'm trying to
5 clarify the record to make it clear that there's not
6 going to be any discrimination, that Arizona generators
7 are not going to be treated any differently than
8 anybody else.

9 That's what I'm getting at. Because the
10 whole bugaboo for a prior line was, CAISO will have
11 control. Oh, my gosh. What does that mean? So I just
12 want to make sure that we have a clear record that
13 that's not going to be a problem with this line.
14 That's what I'm trying to do; pitifully, I think.

15 MR. AMIRALI: Member Woodall, I do not -- you
16 have articulated accurately that that is not going to
17 be a concern. There's -- again, I go back to my broken
18 record of the nondiscriminatory treatment of any
19 resources. Everybody has to abide by the same rules.

20 MEMBER WOODALL: And with respect to the
21 actual scheduling, Arizona is not going to be any worse
22 off if their power is scheduled by CAISO as if it was
23 being scheduled in the APS area; is that correct? I'm
24 just trying to drill down on that, so we can get a
25 specific. And my questions might not make sense,

1 but...

2 MR. AMIRALI: No, Member Woodall, they do.
3 And if you indulge me for just one minute.

4 So there are going to be two types of
5 resources, okay, ones that are connected to APS system,
6 and then there are Arizona resources connected directly
7 to CAISO system. And then there are the ones that are
8 connected to something that is a hub, like Palo Verde
9 hub.

10 Palo Verde hub ISO has transmission rights
11 all the way to Palo Verde hub, so a Palo Verde hub
12 resource is, you know, just like a CAISO resource right
13 there. Any line -- any generation that will be
14 connected -- located -- irrespective of where it is
15 located, if it's connected to Ten West Link, and I'll
16 just pick on our line, if it's connected to Ten West
17 Link, it will have the same rights and it will be
18 dispatched using the same criteria as any resource
19 located in southern California or PG&E, and it will
20 become a part of the CAISO network.

21 MEMBER WOODALL: Thank you. You've answered
22 my question extraordinarily well, both of you. Thank
23 you so much.

24 Please proceed at pace, ma'am.

25 MS. CHANG: Yes. I want to emphasize one

1 more thing on this slide. Member Haenichen earlier
2 asked about flows. In the western EIM market, they do
3 publish flows. In this lower left-hand side, they're
4 shown by quarters, which means they are average of
5 hours 1 through 24 for the quarters. And you will see,
6 I know it's a lot of dots and colors, but you will see,
7 in Quarter 2 of 2018, the imports into APS from
8 California, which is the light blue dropdown in the
9 graphic, by hour. And similarly, the light blue is
10 always representing APS and California ISO. In the
11 other quarters, they're above, that means APS is
12 exporting into California.

13 So you can see from this, I know this is only
14 a subset of the market, but it is the imbalance market,
15 it's the realtime market, and you can see the flows
16 between APS and California ISO. And we summarize it on
17 the table on the right of Quarter 2 and 3 of 2019 of
18 the cumulative gigawatt hours from APS to CAISO and
19 CAISO to APS.

20 CHMN. CHENAL: And Ms. Chang, how do you
21 relate the gigawatt hours to megawatts?

22 MS. CHANG: The left-hand side diagram is in
23 megawatt, because the X axis are hours. So each hour
24 there's so many megawatts being transferred -- on
25 average, these are average numbers.

1 So let's take an example of -- oh, I don't
2 have the hours. Let's say hour 8, so it's like
3 approximately one-third through the 1 to 24. You can
4 see, let's say, approximately 200 megawatts of imports
5 into APS, the light blue dropping down, that's 200
6 megawatts in the hour. And if you multiply that across
7 many hours, becomes megawatt hours.

8 That's the translation between megawatt,
9 which is how many megawatts, and then across time is
10 cumulative in megawatt hours. And then gigawatt hours,
11 just 1,000 megawatt hours.

12 CHMN. CHENAL: Right. Okay, thank you.

13 MS. CHANG: Okay. Next section, we're going
14 back to the macroeconomic analyses that we conducted.
15 Earlier you had asked me about the consistency between
16 this analysis and in the EIS, correct. And I'm just
17 reminded that the analyses conducted in the EIS was
18 done much earlier, and it was not done by The Brattle
19 Group; so I stand corrected on my earlier answer.

20 MEMBER WOODALL: If I may.

21 CHMN. CHENAL: Yes, Member Woodall.

22 MEMBER WOODALL: I just wanted to ask you,
23 are there -- I don't even know if you've had time to
24 glance at it, but maybe somebody could say, and there
25 was a big change, or there wasn't much change, or they

1 addressed it completely differently.

2 MS. CHANG: Yeah, we plan to do that over
3 lunch.

4 MEMBER WOODALL: That's great. Thank you
5 very much.

6 CHMN. CHENAL: Let me just interrupt you just
7 for a second.

8 Ms. Grabel, we're getting into a new area
9 here, and we want to take a lunch break. What's your
10 preference?

11 MS. GRABEL: There are really only two slides
12 associated with the economic stimulus. If the
13 Committee has a lot of questions, obviously it could go
14 for quite some time. If not, then perhaps we could let
15 Ms. Chang finish her presentation, we could break for
16 lunch, and if you have any follow-up questions after
17 the lunch hour, we can convene then.

18 CHMN. CHENAL: Okay. Ms. Chang, will you be
19 reviewing the appendix slides?

20 MS. CHANG: I was not planning on reviewing
21 the appendix slides. They are there to answer any
22 questions. But I'm also happy to go slide by slide in
23 the appendix slide. I was not planning on going
24 through each one of them.

25 CHMN. CHENAL: Well, let's have you finish

1 up, then, and then we'll take our lunch break. And I
2 know I have some questions, and maybe it would be
3 beneficial to go through the slides, see if there's any
4 questions on those --

5 MS. CHANG: Okay.

6 CHMN. CHENAL: -- after lunch.

7 MS. CHANG: Okay. Slide 22, this really just
8 explains what I explained earlier. IMPLAN is a
9 macroeconomic input-output model. And the reason it's
10 input-output is we input the spending, and output comes
11 the economic stimulus numbers inside this database, and
12 the simulation includes all the macroeconomic data
13 points associated with, in this case, Arizona. Which
14 means if you inject a hundred dollars into this aspect
15 of the economy, how much of those dollars flow into
16 different sectors of the economy specific to the state.

17 So the diagram just shows you the inputs we
18 use, construction spending, development spending, tax
19 revenue increases, administrative costs. And the
20 simulation provides output in employment, labor income
21 output, and GDP.

22 Slide 23, again, is the summary that you saw
23 earlier. This is only for the construction phase. And
24 you're right, in the appendix it has actually other
25 phases. But the primary stimulus impact is actually in

1 the construction phase, because as you can imagine,
2 most of the employment and the spending happens during
3 construction phase, as the operations -- if it's an
4 ongoing operation with no significant outages, there's
5 actually very little spending during operations.

6 That's it for the prepared slides on this
7 topic.

8 CHMN. CHENAL: Any questions? I know we're
9 going to have any questions, but any questions about
10 the last two slides from the Committee?

11 (No response.)

12 CHMN. CHENAL: All right. Yeah, maybe this
13 would be a good time to take a lunch break, and then we
14 can come back and we can finish up with Ms. Chang. And
15 maybe it would be beneficial to maybe just go through
16 the appendix slides. And I'll have a few questions,
17 and maybe others will too. So with that, how about an
18 hour break for lunch, is that --

19 MS. GRABEL: Sure. You want to go for an
20 hour?

21 CHMN. CHENAL: Well, maybe we don't need an
22 hour, but I think a half hour is going to be a little
23 short.

24 MS. GRABEL: We have sandwiches out there.

25 CHMN. CHENAL: I think some people would like

1 an hour.

2 MS. GRABEL: 45 minutes?

3 CHMN. CHENAL: We can do 45 minutes. That
4 will give time to catch up on some things and review
5 some of these slides. Let's do it for 45 minutes.

6 Well, let's make it 1:00. We'll start at 1:00. It's a
7 little after 12:00 now, so we'll start at 1:00.

8 MEMBER WOODALL: Ms. Grabel, did you say you
9 have lunches here?

10 MS. GRABEL: We do, yes, we have sandwiches
11 outside.

12 MEMBER WOODALL: Could you give me the market
13 value of those so that I can pay for them?

14 MS. GRABEL: I will do so.

15 MEMBER WOODALL: Thank you very much.

16 MS. GRABEL: Sure.

17 CHMN. CHENAL: All right. We'll see everyone
18 at 1:00.

19 (Off the record from 12:07 p.m. to 1:14 p.m.)

20 CHMN. CHENAL: All right. Are we ready to
21 begin the afternoon session? Let's see. We left off
22 with Ms. Chang, and I'm going to have some questions.
23 Before we get into the assumptions, I'd kind of like to
24 go back and ask the follow-up questions now. And I
25 know Member Hamway has a question, so maybe we start

1 with Member Hamway and then I'll ask a few questions
2 and then maybe some other people as well.

3 So Member Hamway.

4 MEMBER HAMWAY: Thank you, Mr. Chairman.

5 In the decision denying the CEC, one of the
6 comments was that there was no guarantee that the
7 construction jobs would come from Arizona.

8 So one of the questions I have for you, I'll
9 butcher your name, Ali, is do you already have a
10 subcontractor in mind that's going to do the
11 construction? And if so, where is their corporate
12 offices? And how can you guarantee these construction
13 jobs will be from Arizona, maybe not from Blythe? You
14 know, because the population -- it would almost be
15 maybe cheaper and easier to get employees and concrete
16 and different stuff from California. So how can you
17 guarantee that's going to come from Arizona?

18 MR. AMIRALI: Member Hamway, we have already
19 signed an engineering, procurement, and construction
20 agreement, or an EPC agreement, for this project. And
21 the company is located in Mesa, Arizona; it's EC
22 Source. EC Source has -- they are a part of the MasTec
23 family of companies. Their headquarters is in Mesa,
24 Arizona, and they are -- they have significant
25 experience building different projects in Arizona.

1 They were also the constructor for the Hassayampa North
2 Gila Number 2 line for APS, and a few other projects
3 for both APS and SRP. So they have significant
4 experience working in the southwest, in Arizona in
5 particular.

6 MEMBER HAMWAY: Okay, thank you. Yeah, that
7 doesn't necessarily mean they're going to hire
8 Arizonans, but I guess you don't have a lot of control
9 over that.

10 MR. AMIRALI: One minute.

11 MEMBER HAMWAY: Okay.

12 MR. ROGERS: I can address that. So
13 EC Source is utilizing union labor, and they're hiring
14 from two union halls, one that covers California and
15 one that covers Arizona. So the Arizona workforce will
16 come from the Arizona labor source, labor hall.
17 Likewise with California, but there will be a little
18 sharing. But predominantly hired through the Arizona
19 hall, if that answers your question.

20 MEMBER HAMWAY: Sure.

21 MR. ROGERS: It's a union contract, so they
22 source locally through that hall.

23 MEMBER HAMWAY: Okay.

24 CHMN. CHENAL: Any more questions?

25 MR. ROGERS: Actually, if I could expand on

1 that. I mean, materials will come locally. We've put
2 announcements out to the various entities, such as the
3 Colorado River Indian tribes, making them aware that
4 EC Source is our contractor, and to reach out to them
5 for various subcontracts.

6 So we're looking at locally sourcing. I
7 believe they'll have a series of show-up locations;
8 most of those will be in Arizona, perhaps one in
9 California. But what that will do is that will dictate
10 the basis of the employment taxes. But there's
11 definitely an effort on our part to source locally
12 where we can.

13 MEMBER HAMWAY: Okay, thank you.

14 CHMN. CHENAL: I wonder if you could put up
15 on the screen Slide 13 of Ms. Chang's testimony. 13.
16 There we go.

17 All right, I have some questions.

18 MS. CHANG: Sure.

19 CHMN. CHENAL: If you look at the second
20 bullet point, prices increase in the evening and
21 overnight hours when Arizona utility-owned generation
22 resources increase output. I do not understand that.

23 My understanding is, just speaking economics,
24 when you increase output, you increase supply, that
25 drives prices down, not up, number one.

1 And number two, in Arizona, as to the first
2 point, Palo Verde hub prices decrease in the middle of
3 the day, at least normally in Arizona, because of the
4 larger demands for electricity for air-conditioning,
5 that gets more into the peak power and the prices go
6 up.

7 So I'm looking at those two points, and my
8 understanding is entirely 180 degrees different from
9 what those two points are saying, and I'd just ask you
10 to explain it. Because I'm sure there's an
11 explanation, and I'm just not seeing it.

12 MS. CHANG: Sure. The price change that you
13 see on the lower right-hand side graph, the blue line.

14 CHMN. CHENAL: The dark blue line?

15 MS. CHANG: The dark blue line is the change
16 in the price due to Ten West Link. So this is not just
17 what the power prices are. Power prices are not 50
18 cents. This is the change in the prices due to Ten
19 West Link. So we're saying because of Ten West Link,
20 during the day prices decrease by about 50 cents, on
21 average, when the sun is shining.

22 CHMN. CHENAL: Because there's more supply
23 available.

24 MS. CHANG: Exactly.

25 CHMN. CHENAL: Okay.

1 MS. CHANG: So there's more supply from all
2 the solar that's been built in California, they have a
3 hard time absorbing all of that in the California
4 system. They'd be happy to sell at negative prices in
5 some cases, which means you're getting paid to take the
6 power, and that actually already starts -- today that's
7 what you hear about the duck curve. During the day
8 there's excess supply in California that flows outside
9 of California -- to outside of California.

10 And then the other hours at night, because --
11 this gets a little bit more complicated. But because
12 there's over -- the excess generation during the day,
13 you actually don't want to turn up the gas plants in
14 California for only the nighttime; otherwise, you would
15 have to do that.

16 If California were an island, and there's all
17 this solar generation during the day, at night they
18 would have to turn up the gas plant. But it turns out
19 it costs money to turn up the gas plant. So if their
20 gas plant is already operating in Arizona, and this
21 line enlarges the capability to flow the power, the
22 generation in Arizona, in this case, during those off
23 hours, are selling a little bit more because of the --
24 because of the price difference. And in this case, the
25 price increases because of the line.

1 And because the price increases, you're
2 selling more. So I understand the supply and demand
3 seems a bit odd. But because the price increased a
4 little bit more, the generation in Arizona tends to
5 sell more because the prices are higher.

6 CHMN. CHENAL: And is that done through the
7 imbalance market?

8 MS. CHANG: This is our simulation of a
9 day-ahead market; it's not the imbalance market.

10 CHMN. CHENAL: The day-ahead market.

11 MS. CHANG: Yes.

12 CHMN. CHENAL: Well, good. I understand what
13 you said, and it restores my faith in the basic
14 principles of economics, because I thought they were
15 turned on their head.

16 MS. CHANG: I'm glad.

17 CHMN. CHENAL: All right. Are there any more
18 questions? Before we get into the remaining slides in
19 Ms. Chang's presentation, any more questions on that?

20 (No response.)

21 CHMN. CHENAL: Okay. So I think we were
22 going to go to --

23 MS. CHANG: The appendices.

24 CHMN. CHENAL: The appendices, yes.

25 MS. CHANG: And the reason they're

1 appendices, they are really supporting the information
2 on the -- the information I have already shared with
3 you.

4 Slide 25, this is really giving you a
5 graphical representation of what I talked about
6 earlier. Scenario A has a different composition of
7 generation supply in Arizona than Scenarios B and C.
8 And you can see that we basically built it up from the
9 three major utilities in Arizona and the supply
10 resources in their system for modeling 2028.

11 Together we added 1,250 megawatts of solar,
12 350 of wind, and 990 megawatts of storage. So the
13 difference -- the sum of the difference between the
14 second bar and the first bar add up to those numbers
15 you see on the --

16 CHMN. CHENAL: And solar DG is what, please?

17 MS. CHANG: Sorry. Oh, solar DG. Solar DG
18 is actually distributed solar resources. We did not
19 change the assumptions on solar DG. You can barely see
20 the dark orange in these graphs, but you should see
21 that they're exactly the same between A, B, and C
22 scenarios. It's only the yellow that has increased,
23 which is utility-scale solar.

24 CHMN. CHENAL: Yes, Member Woodall.

25 MEMBER WOODALL: When we think of distributed

1 generation, would we think of solar panels that people
2 have on their homes or commercial opportunities or
3 commercial businesses?

4 MS. CHANG: Yeah.

5 MEMBER WOODALL: Is that what distributed
6 generation is?

7 MS. CHANG: Yes, distributed generation is
8 what we consider solar panels on a rooftop in homes or
9 sometimes malls and other places.

10 MEMBER WOODALL: Okay, thank you. Thank you.
11 I wanted that on the record.

12 MS. CHANG: And the yellow is utility-scale,
13 which are larger scale centralized solar resources.

14 CHMN. CHENAL: Thanks. Any questions by
15 anybody on Slide 25? If not, let's go to 26.

16 MS. CHANG: 26 is a graphical representation
17 of the gas prices between Scenario C and Scenario A and
18 B. So the dark blue bar shows Scenario B -- sorry,
19 Scenario A and B, and the light blue shows Scenario C.

20 And really the significance of this graph is,
21 you will see between Scenario A and B versus C, for
22 southern Arizona and northern Arizona, the gas prices
23 decrease significantly from about 3.8 to 2.8 dollars
24 per MMBTU.

25 And this is significant in our simulation

1 because we wanted to see, as California energy
2 commission forecasts future gas prices, the relative
3 prices matter. Because if you have similar gas plants
4 in different regions, they're essentially the same cost
5 in dispatch. But if the gas prices, delivered gas
6 prices to the generators between California and Arizona
7 and elsewhere are different, then the lower cost
8 generation have an advantage as far as being dispatched
9 into the system.

10 Okay. Next slide, really the next four
11 slides, are supporting documentation on the economic
12 stimulus.

13 The first, 27, is the construction phase
14 results for -- you see two counties and then Arizona
15 total, and then at the bottom panel you have the taxes.
16 So just to clarify, and I should have talked about this
17 earlier, the taxes here are simulated taxes or
18 estimated taxes. These are not taxes that the project
19 sponsor pays. These are taxes resulting from the
20 rippling effect of the money spent in Arizona and those
21 people's taxes, either corporate tax or employment tax.

22 Okay. Next slide, 28, is not summarized in
23 the executive summary, but we also estimated these
24 during the operations of the line. There are a small
25 amount of employment and output impact for Arizona, for

1 both the counties and Arizona as a whole.

2 And then earlier we also talked about solar
3 construction, so the next two slides are first
4 construction phase of the solar resources that are
5 enabled by the Ten West Link. Again, we only took half
6 of what we see in the interconnection queue, and we
7 estimated the various macroeconomic impact, including
8 employment.

9 And then the last slide includes during the
10 operations of the solar resources. Again, there is not
11 a lot of jobs once a project is built, but there are
12 some. So you can see the employment impact on the
13 counties, as well as Arizona as a whole, for the
14 operational phases of the solar resources induced by
15 Ten West Link.

16 CHMN. CHENAL: And could you describe, for
17 example, on Slide 30, direct effect versus indirect
18 effect? Just review that briefly.

19 MS. CHANG: Yes. Direct effect is the direct
20 spending. That is when Ali talked about using an EPC
21 contractor, engineering, procurement contractor. It's
22 the direct payment to the people, as well as the
23 material that's directly used in the project. So
24 that's the direct impact.

25 The indirect impact is those businesses may

1 have their own suppliers from the economy. So, for
2 example, cements have other inputs that's from the
3 county, that's the indirect impacts, and they have
4 employees and they have spendings.

5 And then the induced are the employment
6 created by all these, including -- the dollars that
7 people receive from the project, and then they in turn
8 go into the economy and spend them on restaurants and
9 purchases that stay in the economy. So induced is the
10 third effect.

11 CHMN. CHENAL: All right. And then, of
12 course, the last slide is the offices that you have.

13 MS. CHANG: Yes, if you want to know our
14 offices. I think this is outdated. We actually have
15 one more office or two more offices.

16 CHMN. CHENAL: Very good. Does the Committee
17 have any questions of Ms. Chang?

18 (No response.)

19 CHMN. CHENAL: Mr. Arias, do you have any
20 questions of Ms. Chang?

21 MR. ARIAS: Chairman, yes, we do.

22 CHMN. CHENAL: Okay.

23 MR. ARIAS: I do want to start first, Member
24 Woodall posed a question about the filing of the IRP
25 plans. The date for the 2019 IRP plans is April 1st,

1 2020.

2 MEMBER WOODALL: May I further inquire as to
3 when it would be anticipated that the Commission would
4 have those plans before them to acknowledge or not
5 acknowledge?

6 MR. ARIAS: I will clarify that.

7 MEMBER WOODALL: Thank you very much.

8 CHMN. CHENAL: Remind us again, IRP.

9 MR. ARIAS: Integrated resource plans.

10 CHMN. CHENAL: And describe, maybe, what that
11 is, for the benefit of the Committee.

12 MR. ARIAS: Those are the plans that
13 describe -- I think one of our engineers can give us a
14 better explanation of this. But it, in turn, is the
15 resources that the utilities are planning to be using,
16 including in their generation, for -- I don't know how
17 many years out they plan for.

18 MS. CHANG: I can supplement. It's typically
19 a ten-year plan for the utility to -- as you know, load
20 grows, economic growth. So utilities typically have to
21 plan for the future, because it takes years to build
22 power plants and transmission lines.

23 And so the resource plan is a way for the
24 utility to plan for the future by first looking at the
25 growth on their system, expected growth on their

1 system. They also take into consideration energy
2 efficiency and demand response that will then reduce
3 the demand, either through -- usually through utility
4 programs. And then they build up the generation
5 resources necessary to meet that demand into the
6 future.

7 And if there's not sufficient amount of
8 resources, both for energy and for capacity, then they
9 need to either build a power plant or purchase
10 resources or output of resources to meet that need.
11 That's their long-term plan for the power systems to
12 work into the future.

13 CHMN. CHENAL: Right.

14 Member Woodall.

15 MEMBER WOODALL: If I may, so it's my
16 understanding that utilities of a certain size are
17 required to file integrated resource plans at dates
18 that may be either prescribed by the rules themselves
19 or dates that the Commission issues; is that correct?

20 MR. ARIAS: That is correct.

21 MEMBER WOODALL: Okay. So it's only
22 utilities of a certain size, is my understanding, and
23 you can confirm that with your engineer. But these
24 plans are filed, and then they are evaluated. And then
25 at some point Staff might draft a report, perhaps. And

1 then those plans would be presented to the Corporation
2 Commission, who would then either acknowledge or not
3 acknowledge them; is that your understanding?

4 MR. ARIAS: That is my understanding. I can
5 give a more -- answer your question fully there. The
6 plans become publicly available April 1. Staff
7 presents a recommendation before the Commission to
8 acknowledge one year after the plans are filed. The
9 planning period is also 15 years.

10 MEMBER WOODALL: Thank you, Mr. Arias. I
11 appreciate your information.

12 MR. ARIAS: You're welcome. And if you do
13 want the generation capacity of those utilities, it's
14 50 megawatts or greater.

15 MEMBER WOODALL: So when I said size, that is
16 what you were referring to?

17 MR. ARIAS: Yes.

18 MEMBER WOODALL: They have to have that much
19 generation, and they have to file reports. Smaller
20 ones, like an electric cooperative, does not have to
21 file an IRP?

22 MR. ARIAS: Depending on their size, of
23 course, yes.

24 MEMBER WOODALL: Correct, correct. But we're
25 not getting anything from a teensy weensy utility that

1 doesn't own any generation, for example?

2 MR. ARIAS: Correct.

3 CHMN. CHENAL: So Ms. Chang, during one of
4 the breaks I had a brief discussion with your associate
5 about developing a graphic that I think would be very
6 helpful that would kind of bring together many of the
7 things that we've been discussing. And I'm not going
8 to try to describe it on the record, other than to say,
9 generally, kind of a flowchart or a diagram that would
10 kind of explain who's involved with the buying, the
11 selling, and scheduling of the power, so we get a
12 better feel for the structure of what actually is
13 taking place behind the scenes.

14 MS. CHANG: Are you asking that for Arizona
15 or the California system? Because that differs.

16 CHMN. CHENAL: Well, both, because this line
17 is going to be used by both. And so how -- how power
18 is scheduled, bought, sold, delivered through this
19 line, what are the various entities that are at play
20 here. There's CAISO, there's APS, there's a scheduling
21 agent. I mean, I'd like a graphic that pulls this all
22 together to give us an easy-to-understand diagram of
23 who's involved with the buying, selling, scheduling,
24 delivery of power across this line.

25 MS. CHANG: Sure.

1 MR. AMIRALI: Chair.

2 CHMN. CHENAL: Yes.

3 MR. AMIRALI: Chairman Chenal, I would
4 request that it can't just be this line because, as we
5 had mentioned, it is an interconnected network. So you
6 will see -- typically when you do a model of this
7 nature or a, you know, or a diagram of this nature, the
8 power flows across a path.

9 CHMN. CHENAL: Yes. And of course, as large
10 as you have to make it to make it understandable. I'm
11 not asking for how a line in, you know, southeast
12 Georgia would be impacted or -- you know, let's just
13 keep it to the entities that would be impacted by this
14 line, the balancing authorities, the scheduling. Just
15 who the players are in the buying, selling, scheduling,
16 and transport of this -- transmission of this power.

17 MS. CHANG: It may be more useful to have
18 several slides to lay it out, as opposed to one
19 picture --

20 CHMN. CHENAL: Sure.

21 MS. CHANG: -- because that might look like a
22 spaghetti factory.

23 CHMN. CHENAL: Yes, yes. Whatever it takes
24 to kind of help explain that, I think. Because I still
25 have maybe some questions, and I don't want to belabor

1 on the record, and I think others do too. So I think
2 kind of having that general overview would be helpful.

3 MS. CHANG: Okay, sure.

4 CHMN. CHENAL: However you believe it best to
5 be depicted. But I think some graphic depiction, I
6 think, would be very helpful --

7 MS. CHANG: Okay.

8 CHMN. CHENAL: -- as opposed to a narrative.

9 MS. CHANG: Okay, we will try our best. But
10 if you do still have additional questions about how the
11 market operates or how the line will be operated, you
12 know, please feel free to ask. Because I can tell you
13 right now, pictures, though they tell a thousand words,
14 don't necessarily explain it very well. So if you have
15 any lingering questions, I'll try my best to also
16 explain it.

17 CHMN. CHENAL: Well, I do, actually. I guess
18 it's because I don't understand exactly how it works
19 that I'm asking for this.

20 I mean, I can recite back like a parrot some
21 of the names of these entities, these balancing
22 authorities, these schedulers, you know, there's
23 buyers, there's sellers. But if I'm a buyer in
24 California of power, who do I place the order with? My
25 local utility, and then the utility gets with CAISO in

1 the day-ahead market to try to assume how much power
2 I'm going to need to order tomorrow. And then an order
3 is placed by CAISO somewhere with some scheduling agent
4 or something and somehow as kind of an offer. And then
5 there's someone in Arizona, say APS, that says, yes, we
6 can deliver the power and then that transaction is
7 made. And then there's a delivery of that power
8 somehow through the grid. And then there's someone who
9 gets a bill and someone who gets some money. Now, how
10 does that work? That's my question. Who controls
11 that?

12 MS. CHANG: Okay.

13 CHMN. CHENAL: How does that all work
14 interconnected?

15 MS. CHANG: Let me supplement what we have
16 already been explaining, and hopefully that will help
17 color the picture.

18 So suppose you are -- suppose you are a buyer
19 of power, and let's not even talk about -- maybe to
20 simplify it, let's say you were Southern California
21 Edison. You have to buy power to serve your local
22 residential customer, okay.

23 You either -- putting aside the market,
24 forget about the spot market that's operated by
25 California ISO. You have the liberty to enter into a

1 long-term contract. Assuming you don't already own the
2 generation, you have the liberty to enter into a
3 long-term contract for power. And think of that really
4 as a financial transaction, not an electron from one
5 location to another location. And that's important,
6 because really what you're doing is you're paying for
7 power for the next, say, 10 years, and somebody is
8 using that promise to pay to build a power plant.
9 Let's say it's a solar power plant, okay.

10 So there's a financial transaction between
11 the buyer, in this case Southern California Edison
12 needs more energy or power to serve their customer,
13 whether it's residential customer or the local
14 commercial customer. They are free to enter into a
15 long-term contract. Those contracts are actually
16 regulated by the California CPUC, Public Utility
17 Commission. So that's a financial transaction. That's
18 a contract, physical -- like a contract, say I will
19 buy, I will pay, you will sell, and there's all kinds
20 of terms.

21 Later on, when the time comes where the power
22 needs to be delivered, okay, the ISO has a role in
23 making sure that the power system stays balanced and
24 the power is going to flow where the power is needed.
25 In this case, in the earlier example, Southern

1 California Edison entered into a financial contract,
2 let's call it a solar power plant in California, okay,
3 it's a bilateral financial contract.

4 The ISO says, there's all this solar from the
5 same power plant. That power is going to flow on to
6 the system. That power also bids a price. That says,
7 unless the prices are lower than \$30 -- negative \$30,
8 I'm going to flow my power, okay. That means I'm
9 bidding in a negative price -- I know that gets even
10 more complicated. Maybe let's make it easier.

11 Zero price. Unless the price dips below
12 zero, I'm flowing my power. So the solar plant says,
13 unless the price is zero, you're going to accept my
14 power. And that's the ISO's job to accept that power
15 onto the power grid. The buyer in this case doesn't
16 really have a willingness to pay from an economic
17 sense. The ISO acts like a single buyer in this real
18 -- in this marketplace.

19 The ISO knows how much load Southern
20 California Edison has, and as part of serving that load
21 is the solar power plant that just bid in zero, it's
22 going to accept the power from the solar power plant,
23 it's going to be part of all the power that's flowing
24 on the system, and part of that will flow to Southern
25 California Edison in serving its customers.

1 So that's how a system works. It's actually
2 very similar to how APS runs its own system. The only
3 difference is APS is both potentially -- it serves the
4 load, just like Southern California Edison, it has
5 customers behind it, retail customers, commercial,
6 industrial, and residential. It can, just like
7 Southern California Edison, can enter into a financial
8 contract with a solar plant in Arizona and pays for it,
9 but it also operates the transmission system. In
10 Arizona it operates in a sense that it's dispatching
11 power plants in Arizona based on not bids, but costs,
12 because it doesn't have a market, per se. So it's very
13 similar, but the utility is acting as the system
14 balancer, so to speak.

15 CHMN. CHENAL: So let me come up -- a couple
16 follow-up questions --

17 MS. CHANG: Sure.

18 CHMN. CHENAL: -- to the example you gave.
19 So Edison will have a power purchase contract, say, for
20 a steady supply of power for 10 years, let's make that
21 assumption, as part of the CAISO system. It
22 anticipates that it's going to need additional power
23 tomorrow, for whatever reason. And so it goes to -- it
24 goes -- CAISO then goes somewhere to get that
25 additional power to keep its system balanced.

1 MS. CHANG: Correct.

2 CHMN. CHENAL: Where does it go and how does
3 that work? What is the market or whatever it goes to
4 to buy the power that maybe APS is willing or that
5 solar generator is willing to feed into the CAISO
6 system?

7 MS. CHANG: Exactly. So putting aside the
8 long-term contract, you're right, in the realtime --
9 even in the day-ahead, there's going to be more energy
10 they need. And they just -- in the CAISO system, they
11 just submit -- and CAISO knows how much load there is,
12 and it just buys enough power. And there are many
13 resources that do not have those long-term financial
14 contracts, they're just selling in the power -- they're
15 just selling in the market.

16 CHMN. CHENAL: And what is that market?

17 MS. CHANG: That's called a spot market.
18 There's a day-ahead energy market, plus ancillary
19 services, and a realtime market.

20 CHMN. CHENAL: And what is the realtime --
21 and maybe we need a little description about realtime
22 and day-ahead market.

23 MS. CHANG: Yes. Day-ahead market is
24 basically saying, in a day-ahead time frame, so I look
25 forward 24 hours, I'm anticipating how much load that

1 needs to be served. And I, as California ISO, is going
2 to turn on certain power plants in anticipation of next
3 day's need, and that's called scheduling. I'm
4 scheduling power plants to turn on certain times. Some
5 of them have very, very long startup times, so they
6 have to turn it on even days ahead.

7 CHMN. CHENAL: And is there a scheduling
8 authority?

9 MS. CHANG: Yes.

10 CHMN. CHENAL: Is there a scheduling entity
11 that's --

12 MS. CHANG: Yes, yes.

13 CHMN. CHENAL: Can you describe that?

14 MS. CHANG: Scheduling -- the scheduling
15 coordinator in California resides within CAISO, but it
16 is a part of the CAISO. They are the scheduling
17 coordinator.

18 MR. AMIRALI: I would like to -- Ms. Chang,
19 what she's describing is accurate; however, as I said,
20 the devil gets further -- the further you go into the
21 details, that's where you really find him.

22 So there are a couple of functionalities. So
23 going back to your example, Mr. Chairman, you have --
24 in the day-ahead, let's say -- going back to the
25 example that you gave. In the day-ahead, Southern

1 California Edison decides that they have a long-term
2 contract, but tomorrow's load is expected to be higher.
3 They have choices.

4 They have a choice to go to a generator
5 scheduling coordinator and sign a supply contract for
6 the hours that they are short. They also have a
7 choice -- and in that situation, it's more of a
8 bilateral transaction between the two, southern
9 California scheduling coordinator and, for the sake of
10 argument, say Calpine, big generator, also has a
11 presence here, their scheduling coordinator.

12 They can also do what Ms. Chang was
13 describing, to come into the realtime. The ISO has the
14 responsibility -- as a reliability entity, they have a
15 responsibility to making sure that there are adequate
16 resources to meet, and they have got provisions in
17 there from the -- because the utilities are required in
18 California to sign what is called RA contracts, so they
19 have to procure adequate capacity.

20 So they will look at the system and say, is
21 there adequate resources committed to meet tomorrow's
22 demand? And if there are not, do I need to step in?
23 But those decisions are made simultaneously based upon,
24 you know, whether there are adequate supply or not that
25 has already been procured.

1 CHMN. CHENAL: So let's keep going here, and
2 this is very helpful to me. I'm sorry to drag it out,
3 but this is very helpful to me.

4 So CAISO, in order to -- well, in order to
5 provide the supply, the electricity for the load that
6 it anticipates it will need now or tomorrow, may also
7 go to another, like APS, to acquire the power.

8 MS. CHANG: Correct.

9 CHMN. CHENAL: Now we're getting into the
10 purpose for this line, are we not?

11 MS. CHANG: Yes.

12 CHMN. CHENAL: I'm trying to get the big
13 picture, and then bring it down to the reasons why this
14 line may be helpful in that regard.

15 So now we have -- we bring into the picture
16 delivery of power --

17 MS. CHANG: Yes.

18 CHMN. CHENAL: -- from, say, another source
19 that requires a transmission line. So who controls the
20 traffic on the line? That's a question that's been
21 nagging me from the beginning here.

22 MS. CHANG: Yes, I understand.

23 CHMN. CHENAL: Maybe explain how that's --
24 how it's controlled. There's only so much capacity on
25 the line.

1 MS. CHANG: So I want to take this from an
2 Arizona perspective. So suppose -- this line adds
3 flexibility, as I said before, to the entire system.
4 So if I were APS and I have generation, okay, and I
5 have load -- I have load to serve, I have owned
6 generation or contracted generation. This line allows
7 me to absorb certain power from, let's make it very
8 simple, although it's not this simple, let's just say
9 California, Arizona. It turns out there is the rest of
10 the west that still exists.

11 If I'm APS and I own generation and I have
12 load to serve, this line allows me more capabilities to
13 sell my power when the prices are high on the border in
14 California. That's why we see that the generation
15 increases in value, because this line actually allows
16 more power to be sold at higher prices, so that
17 increases the value. And it allows -- it increases the
18 capability for APS to absorb some of the power from
19 California as well.

20 Back to your question about control.

21 CHMN. CHENAL: Yes.

22 MS. CHANG: Because APS is not yet
23 100 percent inside California ISO, and that's something
24 we -- you know, completely separate, there is
25 coordination that happens. It's true that this line

1 will be under the operations of California ISO. That
2 means -- I'll put aside what that means. But when it
3 comes to purchases and sales and the power flow,
4 there's still some coordination between, let's say, APS
5 and California ISO.

6 Meaning, obviously, California can't just
7 say, oh, here is power; I don't care who is on the
8 other end. There has to be some -- usually this is all
9 computerized and automated. It's not people saying,
10 I'm going to accept power. But there is some control,
11 but it is automated.

12 Once we start talking about the EIM market,
13 now APS generation is now under California ISO's
14 operations, they can see in realtime what generation
15 can move to balance in the realtime market, but there's
16 limitations how -- think about realtime only a slice
17 above what's needed, because you really have to plan
18 the system a day ahead. You have to, you know,
19 anticipate.

20 CHMN. CHENAL: So let me just stop you before
21 we get too far. So you said there has to be
22 coordination between, say, CAISO and APS.

23 MS. CHANG: For example, yes.

24 CHMN. CHENAL: For example. And who provides
25 that coordination? How is that coordination achieved?

1 I know it's computers, but is there an organization
2 that does it, is there a scheduling authority, or who
3 controls that?

4 MS. CHANG: Yeah, scheduling coordinators,
5 basically.

6 MR. AMIRALI: So Chairman Chenal, APS is a
7 utility, but APS has also got a scheduling coordinator,
8 they're NAERC-certified scheduling coordinators. They
9 have a desk that will be manned 24 hours with the
10 certified personnel. The California ISO is a
11 scheduling coordinator as well.

12 In your example, let's say the transaction is
13 happening at Palo Verde hub. APS scheduling
14 coordinator will offer up their capacity on the Palo
15 Verde hub, and ISO will -- ISO scheduling coordinator
16 will offer up a load on the Palo Verde hub, and that's
17 where the transaction happens.

18 And it is, as Ms. Chang was describing, it is
19 all -- it is a financial transaction that may or may
20 not be accompanied with physical movement or resources,
21 depends upon what the system conditions are at that
22 time.

23 CHMN. CHENAL: And that's because -- I think
24 I've gotten about as far as I need to go. This is very
25 helpful. But that's because APS has certain rights to

1 transmit on a particular line, is that -- I mean, how
2 do they know -- how does the APS scheduling coordinator
3 know it can transmit power, unless it knows I have the
4 right to send the power because I have this much
5 capacity that I can use right now?

6 MR. AMIRALI: Go ahead.

7 MS. CHANG: There are two aspects to this
8 question. One is economic. So APS, at any point in
9 time, can say, well, do I just turn on the next
10 generator or ramp up my generator, or should I ramp
11 down my generator and accept power from California, for
12 example? If it's cheaper to do the latter, then I'm
13 going to turn down, because I have to burn some fuel,
14 I'm going to turn down my generator and accept some
15 power from California.

16 Those things are relatively automated, but
17 that's the decision, that's the brain behind the
18 coordination, that's the economics. The physical flow
19 basically follows -- you know, of course, when you turn
20 down a power plant, then you're basically sucking power
21 from the other direction.

22 CHMN. CHENAL: Of course, if I decide to take
23 power from somewhere else because it's cheaper, I have
24 to know I can get it. And that's what I'm asking right
25 now, is the physical ability to use the line and so

1 it's not -- knowing it's congested --

2 MS. CHANG: Yes, that's the operation of the
3 line.

4 CHMN. CHENAL: -- by somebody else.

5 MR. AMIRALI: Chairman Chenal, basically,
6 there are ratings on each point and each path, and each
7 import point has got its allowable rating. So let's
8 say that SCE and APS are engaging in a transaction or
9 ISO and APS is engaging in a transaction, in the
10 day-ahead market -- let's right now, for the sake of
11 argument, leave the imbalance energy or the realtime or
12 spot market aside.

13 ISO will keep accepting schedules on the Palo
14 Verde scheduling point until they get to the limit of
15 the scheduling, what is called the scheduling limit on
16 a path. And those are WECC prescribed scheduling
17 limits. And in the day-ahead you can have those --
18 once you get to those limits, after that it is based
19 upon whoever is willing to pay more, okay?

20 And let's say that you and I have a
21 transaction where you have told me that, no matter what
22 happens, I want energy. I want to sell you -- and my
23 requirement is to sell you energy or have penalties on
24 a scheduling bus. What I'm going to do is I'm going to
25 bid my price at that bus at zero dollars to make

1 sure -- or become a price taker, actually. I'll become
2 a price taker when I schedule my generation, because no
3 matter what happens I have to sell it to you.

4 CHMN. CHENAL: So you're going to buy the
5 first-class ticket to make sure you get there?

6 MR. AMIRALI: Absolutely, 100 percent.
7 That's a very good example, sir.

8 CHMN. CHENAL: So let's get back to the
9 operational control and what that means. Ms. Chang,
10 you said let's put that aside for a moment. Let's get
11 back to that.

12 Given that background -- and I think it's
13 very helpful. I'd still like to see a picture, because
14 it is a thousand words, to kind of explain the
15 scheduling, the coordination, all the things we talked
16 about that there. But with that as a background, what
17 does operational control of this line by CAISO mean in
18 that -- with that background?

19 MS. CHANG: Let me give it a shot as well.

20 There are two aspects, in my mind, on the
21 operations. And the reason is, a line, a transmission
22 line, is essentially passive, unlike a generation that
23 you can turn up and down. Transmission line
24 essentially is a passive asset. And when we talk about
25 control of the system, we typically mean we're turning

1 up and down the generators at different points in time,
2 and the power flows follows the path of least
3 resistance. So there's not a lot of physical control
4 of the transmission line. There are exceptions to
5 that, but generally speaking, transmission is passive.

6 So when we talk about operational control of
7 the system, we're talking about controlling with
8 toggles on the generation. Do we turn this up? Do we
9 turn that down? We need the system to balance to make
10 sure the frequency and the voltage are balanced all the
11 time, at all points and places. When you switch on the
12 lights, power flowing without violation.

13 CHMN. CHENAL: Does it give any advantage, in
14 terms of scheduling or right to acquire power, to CAISO
15 vis-a-vis APS's right to bring power to Arizona?

16 MS. CHANG: No. The short answer is, control
17 of the transmission system does not at all make
18 determination of what power -- whose power flows on the
19 transmission. The dispatch of the generation, however,
20 does determine which generator gets turned on and off,
21 and that's all -- in the CAISO market, it's all
22 dependent on bids. So the lowest cost gets dispatched
23 first.

24 The other operational control, I know this
25 might be a little more tangential, is there are

1 operational control of the physical transmission asset
2 that, in the APS case, APS has operational control.
3 That means they schedule operations and maintenance on
4 the transmission. If they need to take a certain line
5 down because it needs to make, I don't know, upgrades
6 on the transformers and things like that, APS makes
7 complete control of that and when to do it, how to do
8 it, and all of those things.

9 CAISO is an entity where all of the
10 transmission owners have given ISO the responsibility
11 and the function of approving the operational
12 maintenance on the lines. Now, the physical operations
13 is still by the owner. So if Southern California
14 Edison owns transmission, it is still physically doing
15 the operations or maintenance on the line, but the
16 control over scheduling those operations, that resides
17 with the ISO. Unlike in APS, APS total control; of
18 course, it coordinates with its neighbors so that the
19 system doesn't experience contingencies.

20 CHMN. CHENAL: Mr. Amirali, did you have
21 anything to add to that?

22 MR. AMIRALI: I was just -- Ms. Chang
23 added -- added the operation -- the maintenance aspect
24 to it. I would add two more components.

25 One, scheduling long-term outages. Also,

1 once this line is built, the ISO will be monitoring the
2 flows on that line on a daily basis. We do not -- we
3 don't even get to see them. And the ISO will have the
4 responsibility to make sure that the line is operated
5 in accordance -- within its specified ratings.

6 So, you know, when Ms. Chang talked about
7 moving generations up and down to make sure -- so in
8 addition to monitoring the existing lines that are
9 making up the east of the river path, this will be just
10 one additional line that they will be monitoring and
11 making sure that the -- that the line is at all times
12 operating within its parameters. It has the
13 responsibility of instructing the transmission owner,
14 that will be DCRT, to perform -- if DCRT has to perform
15 maintenance on the line based on our schedule, we have
16 to submit the maintenance schedules to the ISO. The
17 ISO approves. They can actually change the schedule
18 based upon the system needs.

19 Like, for example, let's say one of the lines
20 in the system between the southwest and California is
21 out. And even though it could be a bright and clear,
22 wonderful day, you know, no load condition, the ISO can
23 choose to deny it. That's the operational control. So
24 we have to seek permission -- the transmission owner
25 has to seek permission from the operator before they

1 can even go and touch their assets.

2 CHMN. CHENAL: So is APS one of these
3 transmission owners in that sense, where it would have
4 to seek permission from CAISO to transmit across this
5 line to sell power to California, CAISO?

6 MR. AMIRALI: No, no. That falls under what
7 Ms. Chang was describing, you know, that's the
8 generation side and that happens -- you know, that's a
9 non-discriminative transaction.

10 CHMN. CHENAL: I've asked enough questions
11 for now. I'll catch my breath.

12 MEMBER WOODALL: Can I ask a question?

13 CHMN. CHENAL: Sure, Member Woodall, you may,
14 if you can.

15 MEMBER WOODALL: Just for comic relief. Did
16 you know that Arizona has an Independent Scheduling
17 Administrator Association? Are you aware of that?

18 MS. CHANG: I'm aware of it, but I'm not very
19 familiar with it. Are you familiar with it?

20 MR. AMIRALI: Likewise, I'm not familiar.

21 MEMBER WOODALL: Well, you were talking about
22 scheduling, administering, and what have you. And I
23 happened to recall, I believe there's a woman, her name
24 is Ms. Vicki Sandler.

25 MR. AMIRALI: Yeah.

1 MEMBER WOODALL: And I believe she is the
2 general role regarding that. So I think that was
3 intended for when we were going to have retail
4 competition, but I'm not sure. But I was wondering if
5 Staff might be able to just give us a brief overview
6 regarding that.

7 And my understanding is that Arizona has just
8 been in phase one. Nobody has been issued a
9 Certificate of Convenience and Necessity as an energy
10 provider. So I don't know that they're actually doing
11 any scheduling, but it would be helpful to me if
12 someone from Staff could get me a thumbnail, repeat,
13 thumbnail, description of that.

14 MR. ARIAS: Staff can do that.

15 CHMN. CHENAL: Okay, thank you very much.

16 MR. AMIRALI: Woo-hoo, a question for the
17 Staff.

18 MEMBER WOODALL: Oh, don't worry, I have a
19 lot for them.

20 CHMN. CHENAL: All right. So I think those
21 are the -- I appreciate the explanation and the deep
22 dive into some of the operational aspects of how the
23 power is bought and sold and scheduled and all that. I
24 still would like that pictorial.

25 MS. CHANG: Okay.

1 CHMN. CHENAL: That will keep it all together
2 for me. And I'm sure we'll come back to the definition
3 again of operational control. That was kind of a lot
4 to absorb right there, so we might come back to that
5 and have another go at what that actually means,
6 because I think that's an issue in the case. Issue
7 isn't the right word, but it's something we need to
8 make sure is fully explained in the record. I'm sure
9 you have, but I'm just saying sometimes we need to hear
10 it more than once; I do. I'm talking about myself.

11 MS. CHANG: One of the -- what I hear your
12 concern is, if there's any potentially discriminatory
13 treatment of generation. I think one of the things to
14 be clear is in the spot market, which is the day-ahead
15 and realtime market, it's all bid-based. It's not at
16 all about, you know, who owns the generation, what type
17 of generation. It is all bid-based. The CAISO's hands
18 are tied. That's their market rule.

19 CHMN. CHENAL: And I appreciate that, and I
20 think we'll get a memo on that just to make sure the
21 record is clear.

22 MS. GRABEL: Certainly, Chairman. And we
23 will provide you with the illustration you asked for.

24 Also, for your reference, we discovered that
25 the CAISO actually has a YouTube channel that has a

1 couple of really kind of short, but very
2 layperson-friendly -- not to suggest you're a
3 layperson, but I am too, and I have found it very
4 helpful just to watch how the ISO market works, how
5 the EIM market works, as well as the CAISO's role in
6 it.

7 And so if you'd like, we can give you an
8 exhibit to show you how to access the YouTube channel
9 as well, if that would be helpful.

10 CHMN. CHENAL: And how long are those?

11 MS. GRABEL: Two to three minutes each.

12 Might be something just for --

13 CHMN. CHENAL: Might be something to actually
14 present here.

15 MS. GRABEL: Okay, we can take a look at
16 doing that.

17 CHMN. CHENAL: We can put it up on the
18 screen. I think that would actually be very helpful,
19 it would be very good to have that.

20 Member Haenichen, did you have any questions
21 at this point?

22 MEMBER HAENICHEN: Not really any questions,
23 just an observation.

24 CHMN. CHENAL: Any observations at this
25 point?

1 MEMBER HAENICHEN: Yeah, thank you.

2 This project involves a long-term decision.

3 In other words, if it's approved, it's going to be

4 built, and it's going to be there for 50-plus years.

5 So I think it's incumbent upon all of us in this room

6 to think about the long-term implementations of that.

7 What's going to happen to markets, what's going to

8 become obsolete and what's going to last forever, what

9 new things are going to happen.

10 One of the big question marks in all of these

11 discussions is storage. And electrical storage, to

12 which in my opinion there is not a cost-effective,

13 viable, reliable solution as yet, I have no doubt there

14 will be one at some point, but that's going to have a

15 huge impact. Because as has been pointed out here,

16 that duck curve and so forth, to make that manageable,

17 you have to be able to store large quantities of

18 electricity that's quickly accessible.

19 So that's the way my thinking process is

20 going as I figure out how I feel about this project.

21 So it's not -- this is not just a glib, short-term

22 deal. It's going to have implications for 50 or more

23 years for both California and Arizona.

24 MS. CHANG: Yes, I actually completely agree

25 with you. It's really no use to look at this from a

1 short-term perspective. This is a long-term
2 investment, long-term asset, the benefits to Arizona
3 would be long-term. And I agree with you there are a
4 lot of uncertainties around the resource types of the
5 future and the relative costs of those resources.
6 There might be resources we can't even fathom today
7 that will be built in the future. Transmission does
8 provide an option value for all of those potential
9 changes in the system.

10 I also agree with you about the storage in
11 the sense that there are some uncertainties around the
12 cost of battery storage. But one thing that's very
13 useful, and that's why we include it in the slide,
14 there are hydro storage, hydro resources in California,
15 and of course Pacific Northwest, and adding
16 transmission capability across the system allows
17 Arizona to have access to that in the future. So this
18 is all good for Arizona, given the uncertainties of the
19 resource mix into the future.

20 MEMBER HAENICHEN: Another example that just
21 occurred to me that I've been thinking about of what's
22 going to happen in the future. Natural gas is a
23 byproduct really of oil drilling, largely speaking.
24 And there's a movement underfoot now, which is gaining
25 tremendous traction, for a change in the way cars are

1 built or vehicles in general.

2 And I believe in not the near future, but
3 perhaps in 20 years, almost all the vehicles will be
4 electrically powered, because they'll have better
5 batteries and what have you. Well, that's going to
6 have tremendous impact on the petroleum industry. They
7 will no longer be drilling more and more wells to get
8 more and more oil; and therefore, there won't be as
9 good a supply of natural gas. So the price on that's
10 going to go up. So that's just another one of these
11 things you have to think about way out.

12 There's an ancient Chinese proverb that
13 changed my life, and that is: Look afar and see the
14 end from the beginning. And that's changed my life and
15 that's what I do at these hearings, or when I go to
16 Costco to buy something.

17 CHMN. CHENAL: Okay. Does the Committee have
18 any more questions? I understand this is a panel, and
19 we'll move on to another witness here, a presentation.
20 But does the Committee --

21 MR. ARIAS: Excuse me, Chairman.

22 CHMN. CHENAL: Yes.

23 MR. ARIAS: Chairman, I still do have a
24 couple more questions.

25 CHMN. CHENAL: Please, absolutely.

1 CROSS-EXAMINATION

2 BY MR. ARIAS:

3 Q. Ms. Chang, good afternoon.

4 A. (BY MS. CHANG) Yes.

5 Q. Just a couple questions either to clarify the
6 record or gain some additional information.7 Have you quantified the amount, whether it's
8 dollar amount, megawatt hour amount, or number of
9 purchases, of increased EIM purchases by Arizona
10 utilities that will occur once the line is in service?11 A. (BY MS. CHANG) That's a good question. We
12 consciously did not simulate the EIM market, and the
13 reason is -- the whole reason of existence of a
14 realtime market, in this case the EIM market, is to
15 adjust the -- what happens between the day-ahead and
16 realtime. And usually those adjustments are associated
17 with load changes from expectations, wind and solar
18 output adjustment from expectations.19 That means for us to simulate the EIM market,
20 we would induce uncertainties between the day-ahead and
21 a realtime market. We can do that, we have done that
22 in other context and have done those kind of analyses
23 for the EIM parties, actually, but we have not done
24 that for this. Which means that the value of the line
25 is actually greater than what we estimate, because we

1 haven't shown the value of this line given the
2 uncertainties between the day-ahead and a realtime
3 market.

4 So the short answer is, we haven't simulated
5 the EIM market and we haven't simulated the value
6 associated with this line specific to the EIM market.

7 Q. Okay. Couple more questions. Can you
8 generally describe how the cost of the transmission
9 line will be covered through the rates paid by Arizona
10 ratepayers and California ratepayers?

11 A. (BY MS. CHANG) Yes. The revenue
12 requirement, the full cost of this line are added to
13 the California ISO's transmission access charge paid
14 for solely by California ISO ratepayers.

15 Q. Okay. So that would be the construction of
16 the line, correct?

17 A. (BY MS. CHANG) All of the costs associated
18 with the line. Revenue requirement includes the
19 capital costs, the return of and on the capital, as
20 well as all of the operations and maintenance costs
21 associated with the line.

22 Q. So will no Arizona utilities have to pay a,
23 what is it, a transmission access charge to send power
24 on this line?

25 A. (BY MS. CHANG) Correct.

1 Q. They will not have to pay?

2 A. (BY MS. CHANG) They will not have to pay for
3 this line.

4 A. (BY MR. AMIRALI) Mr. Arias, I would just
5 like to slightly modify Ms. Chang's statement. It is
6 paid by the California ISO customers. She said
7 ratepayers.

8 A. (BY MS. CHANG) Correct.

9 A. (BY MR. AMIRALI) California ISO does not
10 have any ratepayers.

11 Q. Okay, next question. I guess this goes back
12 to the -- what types of generators are going to be
13 connecting to this line and whether or not those type
14 of generators would come before this Committee.

15 Regardless of the type of generator, there
16 will still be a gen-tie and a substation connected to
17 those generators; and in order for them to connect to
18 the line, those projects will still have to come before
19 the Committee, correct?

20 A. (BY MS. CHANG) That is a jurisdictional
21 question. Maybe Ms. Grabel will know.

22 Q. Just wanted to put it on the record. Just
23 the fact that those gen-tie projects, I think, still
24 have to come before the Committee, regardless of the
25 type of project, whether it is, I guess, going back

1 to --

2 CHMN. CHENAL: Well, we've had -- we've had a
3 number of projects, applications for gen-tie lines
4 between, say, a solar photovoltaic plant, over which we
5 do not have jurisdiction, and interconnecting with a
6 transmission line. So those are fairly typical.

7 MEMBER WOODALL: So yes, we do.

8 MR. ARIAS: That was just to clarify the fact
9 that, regardless if it's a solar PV or a thermal plant,
10 that discussion earlier, the project will still have to
11 come before the Commission in way of the gen-tie or the
12 substation to connect to the line.

13 MEMBER WOODALL: If it meets the definition
14 of "line" in the statute.

15 MR. ARIAS: Yes.

16 MEMBER WOODALL: Okay.

17 MEMBER HAENICHEN: Mr. Chairman.

18 CHMN. CHENAL: Member Haenichen.

19 MEMBER HAENICHEN: I just heard a statement
20 made by a witness that there will be no access charges
21 to Arizona utilities to use this line. Would that --
22 can we make that a condition on the EIM?

23 MS. GRABEL: The question is: If the
24 Committee decides to recommend a Certificate of
25 Environmental Compatibility, would the Applicant be

1 adverse to including as a condition that no Arizona
2 utility will pay the transmission access charge? And
3 that's something -- we can talk about that offline,
4 Member Haenichen, and bring the answer back to you.

5 MEMBER HAENICHEN: And get it on the record?

6 MS. GRABEL: Yes.

7 BY MR. ARIAS:

8 Q. My next question is whether CAISO designated
9 the project as a purely economic project or whether
10 there was an economic and reliability concern when
11 addressing the project?

12 A. (BY MR. AMIRALI) So when the project was
13 originally proposed and approved by the CAISO board, at
14 that time -- let me backtrack, okay?

15 Under FERC Order 1000, the projects that were
16 presented and put out for competitive bid, the criteria
17 was that a project has to be justified purely based
18 upon a single category, okay, and the categories were
19 economic projects, reliability project, public policy,
20 public policy-based projects.

21 The CAISO justified this project purely based
22 upon its economics, because that was the requirement of
23 FERC Order 1000 projects. However, they did
24 acknowledge, even in 2014, the public policy-related,
25 as well as the reliability enhancement benefits

1 associated with the project.

2 Since then, this is true -- in reality, even
3 though economics is the primary driving factor for a
4 project like this, a project of this nature is truly a
5 multi-value project that has both reliability --
6 quantifiable reliability and public policy-related
7 benefits.

8 Q. Okay, thank you.

9 And just a final question there. So the
10 primary benefit to the Arizona ratepayers realized
11 through the additional renewable supply -- or, sorry.
12 Let me rephrase the question.

13 Is the primary benefit to the Arizona
14 ratepayers realized through the additional renewable
15 supply being sent to California, which will result in
16 further reduction in Palo Verde hub prices for Arizona?

17 A. (BY MS. CHANG) I think the benefits are
18 multifaceted. One is reduction of delivered energy
19 costs to Arizona customers, electricity customers. Two
20 is the increase of value of generation located in
21 Arizona because of the sale -- the time frame when
22 they're selling, the prices are actually slightly
23 higher, so it increases the profitability, which under
24 regulated -- if an asset is regulated, that benefit
25 should flow back to ratepayers in Arizona.

1 So I think those are multifaceted. And then
2 the third is the access to diverse resources outside of
3 Arizona.

4 MEMBER HAENICHEN: Mr. Chairman.

5 CHMN. CHENAL: Member Haenichen.

6 MEMBER HAENICHEN: I think the Applicant
7 needs to do a better job, between now and the end of
8 this hearing, at least from my viewpoint, of convincing
9 us that this project is going to result in cheaper
10 electricity for Arizona users; and not just yes or no,
11 but quantify it. Is it going to be a trivial amount?
12 And how is it -- I'm not convinced at all that it will
13 happen, so I think you need to do a better job.

14 MS. GRABEL: So, Member Haenichen, Ms. Chang
15 presented extensive testimony that it will result in a
16 savings to utility ratepayers of 2 to \$7 million.
17 What, in addition to that, are you looking for?

18 MEMBER HAENICHEN: Yeah, but that's a trivial
19 amount. Let's say we have 7 million users; that's a
20 dollar a year. That's not important and it's
21 uncertain.

22 MS. GRABEL: We'll address it.

23 MS. CHANG: If there are no other questions,
24 I want to clarify one thing. I think there is a
25 request for historical flow data, and I want to just

1 clarify and put it on the record that we -- we will try
2 to acquire hourly flow scheduled by the California ISO
3 on the Palo Verde intertie constraint in the day-ahead
4 market. Our understanding is that data is available,
5 and we will try our best to get that information from
6 the CAISO. It is --

7 MEMBER HAENICHEN: Excuse me for
8 interrupting. Go ahead.

9 MS. CHANG: Yes, please.

10 MEMBER HAENICHEN: Surely, they must keep
11 track of the amount of energy delivered over the lines
12 over a yearly period. I would think they have that in
13 a big computer database right now. Am I wrong?

14 MS. CHANG: I'm letting you know what we
15 think we can access and be responsive to the request
16 that you placed. I cannot speak to exactly what data
17 they keep on which line.

18 The other thing I think is important to
19 understand is, yes, there must be monitoring of flows
20 over lines, because they have thermal limits and you
21 can't overload every single -- you cannot overload any
22 transmission lines. However, when we think about flows
23 between Arizona and California, it's really flows over
24 an interface across multiple lines at the same time.
25 Because the contingencies or the constraints on those

1 systems are really a system constraint, not just on a
2 single line.

3 So what I'm offering to provide, and we think
4 we have access to this, is the scheduling -- scheduled
5 flow over the Palo Verde intertie between Arizona and
6 California.

7 MEMBER HAENICHEN: The actual flow over a
8 year period?

9 MS. CHANG: Actual flow, hourly flow, yes.

10 MEMBER HAENICHEN: The thermal limit point is
11 not an energy issue, it's power, amount of current
12 flowing in the lines.

13 MS. CHANG: We will give you the hourly flow
14 over the Palo Verde intertie.

15 MEMBER HAENICHEN: I don't even need that. I
16 need to know what the total energy flow over a year is.

17 MS. CHANG: Okay, we'll give you that as
18 well.

19 MEMBER HAENICHEN: And what direction. If it
20 goes both ways, I'd like two numbers.

21 MS. CHANG: Okay.

22 CHMN. CHENAL: Member Hamway.

23 MEMBER HAMWAY: So in response -- in response
24 to Mr. Arias' question about how CAISO chose this
25 project, and you said it was based on economics. And I

1 get your multi- --

2 MS. CHANG: Value.

3 MEMBER HAMWAY: Yeah, the value of the policy
4 and all that. But what was CAISO looking at? I mean,
5 how do the California customers benefit from this over
6 the long haul, since all the costs, the 400 million,
7 are borne by them? So I guess I'm wondering what is
8 CAISO looking at when they're choosing this project
9 based on the economics for California, right?

10 MS. CHANG: Yes, there are numerous benefits
11 to California. One of them is to increase the
12 flexibility of being able to sell and buy power at the
13 border between California and Arizona. And that's --

14 MEMBER HAMWAY: So that's the biggest
15 benefit?

16 MS. CHANG: Yes.

17 MEMBER HAMWAY: So the benefit must be so
18 much greater than 400 million.

19 MS. CHANG: Yes, yes.

20 MEMBER HAMWAY: Over the 50 years?

21 MS. CHANG: Over the 50-year life of
22 the asset.

23 MEMBER HAMWAY: And they amortize that, okay.

24 CHMN. CHENAL: Mr. Arias, did you have any
25 further questions?

1 MR. ARIAS: No further questions.

2 CHMN. CHENAL: Does the Committee have any
3 further questions at this time?

4 (No response.)

5 CHMN. CHENAL: Maybe it's a good time to take
6 our break now, afternoon break, 15 minutes, and we'll
7 come back.

8 (Off the record from 2:25 p.m. to 2:54 p.m.)

9 CHMN. CHENAL: All right. Let's resume the
10 afternoon portion of the hearing. I know there's going
11 to be a few questions, this always happens after a
12 break, and the questions are going to be of Ms. Chang,
13 perhaps Mr. Amirali.

14 Ms. Grabel, I know you want to address one of
15 the issues that was asked before the break; we'll give
16 you the opportunity to do that. Maybe you'd like to do
17 that now, and then we'll ask some questions of the
18 panel.

19 MS. GRABEL: Certainly. I do, also,
20 Chairman, as I mentioned, have a couple of redirect
21 questions for Ms. Chang as well.

22 CHMN. CHENAL: Okay.

23 MS. GRABEL: First is to Member Haenichen's
24 request that we put a condition on the CEC that would
25 prevent any Arizona customers or utilities from paying

1 for the transmission line. Unfortunately, we cannot do
2 that. I hate to keep saying no. And the reason for
3 that is that the transmission revenue requirement is
4 going to be recovered from the CAISO's customers.
5 That's what you've heard often.

6 It is possible that an Arizona utility would
7 purchase generation resources from the California ISO,
8 and in that case, it would be a California ISO
9 customer, and we couldn't put a condition that
10 basically waives the TAC charge for Arizona compared to
11 any other state's utility. I think that would be
12 discriminatory treatment that would also be illegal.

13 MEMBER HAENICHEN: Another technicality.

14 MS. GRABEL: I'm sorry. I hate to keep
15 lawyering you up.

16 CHMN. CHENAL: Did you have some follow-up?
17 I mean, do you want to wait for more questions?

18 MS. GRABEL: Certainly, whatever -- it's your
19 decision.

20 CHMN. CHENAL: Okay. Let me ask a few
21 questions, and I know Member Hamway has a few
22 questions.

23 MEMBER DRAGO: I do, too.

24 CHMN. CHENAL: Okay, good.

25 Let me be impolite and go first, only because

1 I'm afraid I'll forget the question by the time we
2 finish your question.

3 So I think one of the elephants in the room
4 is the concern or fear that was expressed in the first,
5 the Case 130, the previous -- I'm not going to say the
6 same line, but a similar line, and that is this line is
7 going to draw power out of Arizona and leave Arizona,
8 you know, in not as good a position as if the line were
9 not built.

10 And I think I understand better that this
11 line will not really have that effect. There's going
12 to be more generation in Arizona, and it's also going
13 to allow for the energy imbalance market to allow
14 Arizona to get power from Arizona and have
15 counterflows. And I know Member Haenichen would like
16 to see some of those numbers.

17 But it did occur to me, this is the one thing
18 that did occur to me, where based on the previous
19 discussion, especially in the imbalance market, the
20 spot market, let's say, realtime and next-day markets,
21 where there are -- where it's basically a bid for the
22 power, and it's basically the market that decides, you
23 know, the cheapest power is going to be purchased. It
24 does occur to me that, in that situation, this line,
25 with less congestion, will allow California power

1 companies -- or, ISO, CAISO, I guess, to purchase
2 cheaper power in Arizona because there will be more of
3 a demand, because now there will be more ability, a
4 greater ability for CAISO to have access to and acquire
5 spot market power.

6 That will, in effect, drive up the price in
7 Arizona, because what would otherwise be available as
8 lower power in Arizona, will be purchased by California
9 because of a greater demand and greater access CAISO
10 will have. And that cheaper power will go away, and
11 the net effect will be, for example, in the summer,
12 when the days are hot and power companies have to
13 acquire basically power at the peak power rates, will
14 drive up the costs in Arizona because there will be
15 less of the cheap power that will have been drawn off
16 to California.

17 I don't know if I'm expressing the question
18 clearly. But if you get what I'm meaning, you know, a
19 problem that may have existed in the previous line of
20 pulling power away is not the same problem that could
21 be presented here, but the availability of the cheaper
22 power may still be drawn off, to the detriment of
23 Arizona. And I just ask the question and I'm anxious
24 to hear what your answer is to that.

25 MS. CHANG: Well, in the slide, that graphic

1 on the lower right-hand side corner, does show that in
2 some hours, such as the early hours of the day and
3 nighttime hours, the prices do increase. But that's
4 also when Arizona is selling more with the line than
5 less with the line. Yes, right there, and then the
6 nighttime.

7 When Arizona is buying power during the
8 middle of the day, the prices are actually dropping.
9 And it's the combined effect of prices are lower when
10 Arizona is buying and prices are higher when Arizona is
11 selling that generates benefits for Arizona.

12 CHMN. CHENAL: The counterintuitive economic
13 principle that you discussed earlier.

14 MS. CHANG: Well, it's not --

15 CHMN. CHENAL: I shouldn't say
16 counterintuitive. But there's more power being
17 generated, but it costs more at the same time.

18 MS. CHANG: There's more power generated
19 during the day; and therefore, it makes the price lower
20 on the border of Arizona and California, that's during
21 the day. So that's why you see the drop in price
22 during the day. That's all -- because it's lower
23 priced, that's also when Arizona is buying more because
24 of the line. And then at night prices are slightly
25 higher. If you are a generator, you will sell more

1 when prices are higher. So it's actually not
2 counterintuitive.

3 CHMN. CHENAL: Okay. So the second point
4 talks about price increasing in evening and overnight
5 when Arizona utility-owned generation resources
6 increase.

7 MS. CHANG: Yes. And those are not peak
8 periods when Arizona is short of generation. These are
9 resources that are already on, and they are able to
10 generate more. And the reason they are generating more
11 during those hours is so that, instead of turning on
12 another power plant in California, it's cheaper to ship
13 the power from Arizona during that period.

14 CHMN. CHENAL: All right, thank you.

15 Member Hamway.

16 Thank you for that.

17 Member Hamway.

18 MEMBER HAMWAY: So when California is
19 experiencing a blackout, how does this play into that?

20 MS. CHANG: Oh, well, I think the world would
21 come to an end if there's another blackout, a major
22 blackout. That's really difficult to predict. There
23 are so many different potential causes of blackouts.
24 You know, we are in an interconnected AC system, so
25 it's --

1 MEMBER HAMWAY: Well, I think you just said,
2 you know, it costs so much more to power up one these
3 plants if there's a blackout. I'm not talking about a
4 fire, I'm not really talking about that. I'm talking
5 about one of these planned blackouts when I think --

6 MS. CHANG: Oh, planned blackouts?

7 MEMBER HAMWAY: Well, or they just don't have
8 enough power. Is it going to be cheaper and easier to
9 buy it from Arizona than it is to ramp up and do their
10 own thing?

11 MS. CHANG: Yes. For a system to -- to the
12 point that they're actually planning blackouts, that
13 means the reserves are short.

14 MEMBER HAMWAY: Right.

15 MS. CHANG: And that means they have tried
16 everything they've got, including imports, including
17 through the transmission lines. This line from -- you
18 know, if you're talking about blackout in California,
19 you're saying there's a shortage in California. There
20 are other reasons for blackouts. But just from
21 generation shortage, if that's occurring, this line
22 will reduce the frequency of that likelihood, reduce
23 the likelihood of such event, because it is giving both
24 Arizona and California more resources to play with, to
25 put it simply.

1 MR. AMIRALI: Committee Member Hamway, the
2 same scenario also applies for Arizona. Let's say that
3 a couple of generation plants that are serving Arizona
4 load go down. The line will, same way, support --
5 allow for additional -- more power to be transferred to
6 Arizona from California in that situation as well. So
7 the benefit flows in both directions.

8 MEMBER HAMWAY: Okay.

9 CHMN. CHENAL: Thank you.

10 Any other questions?

11 Mr. Drago, Member Drago.

12 MEMBER DRAGO: Thank you.

13 So as I understand, CAISO is a nonprofit?

14 MS. CHANG: Correct.

15 MEMBER DRAGO: And there are 18 members
16 currently, transmission owners. If this case would be
17 approved, whose name goes on this list?

18 MR. AMIRALI: DCRT will become a
19 participating transmission owner with the California
20 ISO, and that will be the entity that will join the ISO
21 as a member.

22 MEMBER DRAGO: And then to be a member, you
23 pay a price, but then it helps you to get the
24 generation being sent to the line distributed
25 appropriately, am I right?

1 MR. AMIRALI: That is incorrect. First, you
2 don't pay a price to be a member. You have to
3 basically be a transmission owner to be a part of
4 the -- to sign a participating, hence the
5 "transmission" word in the participating transmission
6 owner, and it is truly participating.

7 So you basically take your asset, you put it
8 in the ISO control area. ISO, as we had described,
9 will take the capacity of the line, and it will become
10 a part of the ISO-controlled grid. And the
11 transmission owners have no say on what generation
12 flows where.

13 We are -- we will be -- once the line is
14 finished, we will still be the owner of record, we will
15 still be performing all the maintenances approved by --
16 approved by the ISO. The ISO will be -- ISO will be
17 overseeing the flows on the line based upon the system
18 conditions, system topography, and the generation mix,
19 and the location of the loads.

20 MEMBER DRAGO: Got you. Then who pays into
21 CAISO?

22 MR. AMIRALI: So as it was described, the
23 transmission line will have a federally-approved,
24 FERC-approved revenue requirement. The revenue
25 requirement comprises of, as Ms. Grabel described, the

1 cost of the line and -- cost, rate of return, all of
2 the -- and the maintenance and operations cost. It
3 will be approved by FERC. That is no different than
4 what is approved for APS lines.

5 And as I described yesterday, what the ISO
6 does is it has got revenue requirements from different
7 members, different participating owners. It throws it
8 all in the same bucket, and that bucket then becomes
9 the ISO transmission access charge, or TAC, and that is
10 peanut buttered across all the CAISO customers that are
11 loads and exports.

12 So for example, if you are -- like if APS
13 wants to sell generation to California, it's a
14 generator, okay, and it doesn't pay anything. If APS
15 wants to buy, then it's a customer, it pays.

16 MEMBER DRAGO: I see.

17 MR. AMIRALI: And that's how the system
18 works. It's being paid by the loads and exports.

19 MEMBER DRAGO: Thank you.

20 CHMN. CHENAL: Member Woodall.

21 MEMBER WOODALL: Okay. We've talked about
22 economic benefits to Arizona, economic benefits to
23 California, economic benefits to the various counties.
24 What I'm going to ask now I'll phrase in a very
25 indelicate way. How is the Applicant going to be

1 making money off of this project? Explain to me how
2 you will recover -- I just want to know how. I don't
3 want any numbers. I just want to know how are you
4 going to get some income from this?

5 MR. AMIRALI: Absolutely, ma'am. That's
6 actually quite simple, and it's a structure that is
7 very -- that is common for all regulated transmission
8 entities. So whatever I'm describing applies equally
9 to APS, also applies to TEP and Southern Cal Edison.

10 As I had talked about -- keep talking about a
11 phrase called transmission revenue requirements. What
12 we do is we will file a rate case at FERC, and it's a
13 specified -- it's what is called a 205 filing. The 205
14 filing allows us -- and there will be a rate structure
15 that you file along with it. This rate structure
16 contains -- a part of the rate structure is the return
17 on equity that you receive for an investment of this
18 nature. It is negotiated at FERC, approved by FERC,
19 and that will be -- so the rate case already has a rate
20 of return built into it.

21 MEMBER WOODALL: Did you want to share that
22 with us?

23 MR. AMIRALI: Actually, I can share with you
24 what we publicly filed. So when we filed or made our
25 2019 filing for the project, as well as when we filed

1 the project with FERC -- with CAISO, we have capped our
2 return on equity to 10 percent.

3 MEMBER WOODALL: Thank you, that's really all
4 I needed. I was just curious about economic benefits
5 hither and yon, and I just wondered what they were to
6 you, and I don't need any more information.

7 MR. AMIRALI: And as I said, we capped ours,
8 which is very different than what the utilities do.
9 They don't cap their rate of return. We, as a
10 competitive transmission owner, that was one of the
11 values that we upfront offered up to the California
12 ISO. And that makes something -- that's why the FERC
13 1000 or competitive projects are so valuable, because
14 it incentivizes competition and provides additional
15 value for the ratepayers.

16 MEMBER WOODALL: Thank you, sir.

17 CHMN. CHENAL: Just one final question,
18 Ms. Chang, just again on that Slide 13 at the bottom
19 left. This line, the Ten West Link line, because of
20 the increased capacity offered by the line, has the
21 benefit of increasing generation of electrical power.
22 And because of how you described that the prices
23 increase at various times in the day, that this line,
24 because of this increased generation and the higher
25 prices in the evening and overnight, will generate an

1 extra 95 to \$153 million a year.

2 MS. CHANG: Correct, correct.

3 CHMN. CHENAL: And that money is -- that
4 additional market value increase is certainly to the
5 companies that will be generating the power.

6 MS. CHANG: Correct.

7 CHMN. CHENAL: But will that inure to the
8 benefit of Arizona ratepayers, power purchasers?

9 MS. CHANG: If those generations were owned
10 by the utilities, then, in theory, the ratemaking
11 process should bring those -- net those profits off
12 ratepayers. But of course, it goes through a very
13 complicated ratemaking process. But yes, these are
14 benefits that accrue to the generators; and if those
15 generators are regulated assets, those should accrue
16 back to the ratepayers in Arizona.

17 CHMN. CHENAL: All right, thank you.

18 Ms. Grabel, I think you have some follow-up
19 questions.

20 MS. GRABEL: I do. Thank you, Chairman.

21

22 REDIRECT EXAMINATION

23 BY MS. GRABEL:

24 Q. Ms. Chang, to address Member Haenichen's
25 concern that we don't have enough in the record about

1 the benefit to Arizona utility ratepayers, I have a
2 couple of follow-up questions related to the savings
3 that Arizona utilities will experience because of the
4 access to the EIM that Ten West Link will allow.

5 Do you have any understandings regarding the
6 savings that APS has experienced by virtue of its
7 participation in the energy imbalance market?

8 A. (BY MS. CHANG) Yes. California ISO, as an
9 operator of this EIM market, has calculated over time
10 the benefits to all the participating members of the
11 EIM. And before me, this is all public on the EIM's
12 website, they have estimated over \$120 million over the
13 last four years during which APS participated in the
14 EIM market. This line will increase the transfer
15 capability in the EIM market between APS and the rest
16 of the EIM parties, particularly CAISO.

17 And as I answered Staff's question earlier,
18 we have not added the benefits of EIM in any of these
19 calculations, because we see that as a realtime
20 imbalance, depends on how much uncertainties occur
21 between the day-ahead and realtime.

22 So the additional benefits associated with
23 inducing more transfer capability into the EIM market
24 has not been quantified, but the numbers of \$120-plus
25 million over the last four years will increase over

1 time because of this line.

2 Q. And Ms. Chang, isn't it also true that Tucson
3 Electric Power Company and Salt River Project also
4 intend to participate in the energy imbalance market?

5 A. (BY MS. CHANG) Correct. One of them joining
6 this year, and the other one in 2022.

7 Q. And would you expect those Arizona utilities
8 to experience similar savings that APS has experienced?

9 A. (BY MS. CHANG) Yes.

10 MS. GRABEL: Thank you. No further
11 questions.

12 CHMN. CHENAL: Thank you very much. Your
13 next witness, if you will.

14 MS. GRABEL: Excellent. Do you want to move
15 on to Mr. Amirali, or did you want to take a couple of
16 minutes to look at the ISO videos? I know there was an
17 interest in that.

18 CHMN. CHENAL: I think -- and we've had
19 discussion off the record, and I think it would be
20 beneficial, based on information that's been given to
21 me, to see a couple, three short YouTube videos on the
22 CAISO and, was it the energy imbalance market was
23 another one, at least two of them. Is there another
24 one?

25 MS. GRABEL: The two that I reviewed is how

1 the California ISO market works, which I think is
2 relevant to a lot of the conversation you had with
3 Ms. Chang. The other one was how the EIM works and
4 what the CAISO's role is in the EIM.

5 CHMN. CHENAL: Yeah, I think that would be --
6 and they're short. They're a couple, three, four
7 minutes long?

8 MS. GRABEL: Two to three minutes each.

9 CHMN. CHENAL: Yeah, I think that would be
10 great.

11 MEMBER WOODALL: Mr. Chairman, I'm assuming
12 that Ms. Grabel will file something in the docket so
13 that should the Commissioners want to pull up these
14 YouTube videos, they'll have a page and address?

15 MS. GRABEL: Certainly. We would put
16 together a one-page exhibit that we'll enter into the
17 record.

18 MEMBER WOODALL: Thank you very much. Thank
19 you.

20 MS. GRABEL: Absolutely.

21 So just for the record, the YouTube video
22 we're about to watch is produced by CAISO, and this
23 specific one is on the western energy imbalance market.

24 (Video plays.)

25 MS. GRABEL: That one must have been produced

1 before APS signed up for the EIM. Are you interested
2 in watching the one on the ISO market?

3 CHMN. CHENAL: Sure.

4 MS. GRABEL: Certainly. We'll pull that one
5 up. So this, again, is the California ISO energy
6 market at work, for the record.

7 (Video plays.)

8 MS. GRABEL: Sort of helpful.

9 CHMN. CHENAL: Sure, thank you. Thank you
10 for that.

11 MEMBER WOODALL: Can I ask a question? What
12 were the dates of those videos? I know it says on the
13 YouTube. And did you get this directly from the CAISO
14 website? That's the real question.

15 MS. GRABEL: We got them from a Google search
16 that pulled up CAISO's YouTube channel.

17 MEMBER WOODALL: So we don't know if these
18 are current or not?

19 MS. GRABEL: I believe they were produced in
20 2016.

21 MR. ANCHARSKI: December 8th, 2016.

22 MEMBER WOODALL: Yeah. I'm just wondering if
23 you can find somewhere on the CAISO website that says,
24 and if you want to see an amazing video, or
25 something --

1 MS. GRABEL: Go to the YouTube channel?

2 MEMBER WOODALL: Yeah. It's just like I
3 know -- but I don't know if they're current. I don't
4 know if CAISO is -- I know it's their channel, I get
5 it. But could you just do a little tweaking on that,
6 or at least put the date? You've already got the dates
7 on the record.

8 MS. GRABEL: Certainly. We'll put that in
9 the exhibit that we enter into the record.

10 MEMBER WOODALL: Yes, I think that would be
11 helpful for the Commissioners.

12 MS. GRABEL: Absolutely. Thank you, Member
13 Woodall.

14 Chairman, if you're ready, may we move to
15 Mr. Amirali?

16 CHMN. CHENAL: Yes, unless anyone has a
17 question. Yes, we have questions.

18 Member Haenichen and then Member Gentles.

19 MEMBER HAENICHEN: Just while we're in the
20 mood for these kind of demonstrations, you were going
21 to look up to see if you had a Google Earth survey of
22 the Palo Verde hub.

23 MS. GRABEL: Yes, we are going to do that.

24 MEMBER HAENICHEN: Okay.

25 MS. GRABEL: We'll present that when we get

1 to Mr. Rogers' testimony later on in this panel.

2 MEMBER HAENICHEN: Thank you.

3 MS. GRABEL: Certainly.

4 CHMN. CHENAL: Okay. I think we're ready for
5 the next witness.

6 MS. GRABEL: Mr. Amirali, you are --

7 I'm not doing this. Eli is doing this, and I
8 forgot. Let go of the reins.

9 Go ahead, Mr. Ancharski.

10 MR. ANCHARSKI: Good afternoon, Chairman,
11 Committee Members. My name is Elias Ancharski, for the
12 record.

13

14 FURTHER REDIRECT EXAMINATION

15 BY MR. ANCHARSKI:

16 Q. Hello, Mr. Amirali. I will briefly remind
17 you that you are under oath still. Would you please
18 state your name and address for the record.

19 A. (BY MR. AMIRALI) Ali Amirali, 5 Greenwich
20 Office Park, Greenwich, Connecticut 06831.

21 Q. By whom are you employed and in what
22 capacity?

23 A. (BY MR. AMIRALI) I'm a senior vice president
24 with Starwood Energy Group Global, Inc.

25 Q. You have in front of you what is marked

1 Exhibit DCR-15, correct, or will have that?

2 A. (BY MR. AMIRALI) Yeah. Yes, I do.

3 Q. Can you please identify what is marked
4 DCR Exhibit 15?

5 A. (BY MR. AMIRALI) It is my presentation for
6 this panel.

7 Q. Was the hearing presentation prepared by you
8 or under your direct supervision?

9 A. (BY MR. AMIRALI) Yes, it was.

10 Q. Is the information contained in your hearing
11 presentation true and correct, to the best of your
12 knowledge?

13 A. (BY MR. AMIRALI) Yes, it is.

14 Q. With that, I have no further questions for
15 you, Mr. Amirali, at this time. However, I will
16 interrupt you to lay further foundation. Would you
17 please begin your presentation.

18 A. (BY MR. AMIRALI) Sure.

19 CHMN. CHENAL: Which exhibit number is this
20 again, please?

21 MR. ANCHARSKI: DCR-15, Chairman.

22 MR. AMIRALI: Eli. Thank you, Mr. Ancharski.
23 Chairman Chenal, Members of the Committee,
24 good afternoon again.

25 So in my presentation today, I will try to --

1 I will highlight the differences between the Ten West
2 Link and DPV2 line and address how the ACC concern that
3 led to the -- led the Commission to decline the CEC for
4 DPV2 do not apply to Ten West Link.

5 I will -- I promise you, and I'll keep this
6 brief, I will reiterate some of the Arizona benefits
7 associated with the Ten West Link. And if I go into
8 too much detail, I'm pretty sure Chairman Chenal will
9 ask me to fast-forward.

10 I will state some of the additional benefits
11 to APS associated with the interconnection of Ten West
12 Link to the Delaney Substation. These are very
13 specific benefits to APS, both from an operational
14 viewpoint, as well as some of the reliability benefits
15 that they will realize. I will then follow it up
16 with -- by providing a quick overview of the WECC's
17 path rating process, as well as the status of the WECC
18 path rating process associated with the Ten West Link.

19 And finally, I will conclude my presentation
20 by sharing the results of the technical studies
21 performed by DCRT's technical expert, in conjunction
22 with the WECC path rating process, as well as in
23 support of the economic analysis.

24 BY MR. ANCHARSKI:

25 Q. And if I can interrupt you for a moment. The

1 information you're about to present on can be found in
2 DCR-1, the CEC application, as Exhibit J7; is that
3 correct?

4 A. (BY MR. AMIRALI) That is correct.

5 Q. And also, is there a brief outline of this
6 information found on the laminated map, DCR-2, in front
7 of the Committee Members?

8 A. (BY MR. AMIRALI) Yes, it does, on the
9 right-hand side.

10 Q. Thank you. Nothing further. Please
11 continue.

12 A. (BY MR. AMIRALI) So in 2006, 2007 the ACC
13 denied the CEC for Devers Palo Verde 2, or DPV2 line,
14 primarily due to four major concerns.

15 One was a resource adequacy concern. And I
16 think a Member Woodall described it the best when she
17 said that the DPV2 line in 2007 was being viewed as an
18 extension cord from Palo Verde hub that was going to
19 suck the excess energy from Arizona and deliver it to
20 the California load.

21 The other -- DPV2, because of the way it was
22 designed and was going to be constructed, it was going
23 to require the installation of special protection
24 schemes, and that was also viewed as a reliability
25 concern to the grid.

1 The other impact was the negative economic
2 impacts, as DPV2 would economically benefit California
3 at the -- at the cost -- and it will come at a cost to
4 Arizona consumers. That was the economic concern.

5 Finally, as DPV2 line was going to parallel
6 the existing Palo Verde Devers line, it was expected to
7 traverse through the Kofa Wildlife Refuge, and that was
8 considered to be an environmental concern associated
9 with the line.

10 I will demonstrate, through this
11 presentation, that none of the concerns that drove the
12 Commission's DPV2 decision apply to Ten West Link. Ten
13 West has avoided or have addressed the major adequacy,
14 reliability, economic, and environmental hurdles
15 associated with DPV2 project -- that were associated
16 with the DPV2 project over a decade ago.

17 Far from burdening Arizonans, DPV2 will help
18 provide Arizona electric consumer with cleaner energy
19 resources at lower prices and -- and will bring greater
20 grid reliability and security. And we have been
21 discussing this during the morning session, and
22 Ms. Chang had done a wonderful job addressing most of
23 these things.

24 So let's start with the resource adequacy --
25 on the resource adequacy side. In 2007, the energy

1 business environment was such that one could really
2 truly state that any energy that was not contracted --
3 any energy resource that was not contracted by an
4 Arizona utility was literally flowing west and serving
5 California load. California load was growing at a
6 rapid rate, so was the Arizona load, but there was a
7 different environment. Most of the load was being
8 served by gas resources.

9 Just to, you know -- if you just go back in
10 2007, we had not even built a solar project at all in
11 the west, not just -- the last major solar project that
12 was built in the western U.S. at that time, like I'm
13 talking about a major project, utility-scale, was
14 developed in 1985. So solar was not even a -- solar
15 was just starting. Wind was a northwest resource that
16 was in the northwest, and it had matured, but there
17 were -- you know, we did not have the RPS standards
18 that we have, the greenhouse gas standards were not in
19 place, and the resource mix was entirely different.

20 Today, the energy business environment is
21 radically different than the one that existed in 2007
22 when the CEC -- when the CEC was -- of DPV2 was denied.
23 Today, 2020 energy forecast of California is
24 approximately a thousand megawatts less than what was
25 projected in 2007 -- 10,000 megawatts, actually, less.

1 In addition, the resource capacity planning
2 and regulatory environment today is also significantly
3 different than it was in 2007. The load -- today's
4 load serving entities, both in Arizona and California,
5 are looking to contract for renewable generation
6 projects for both energy and capacity, rather than look
7 for thermal projects or even coal projects.

8 The purpose of Ten West is to add
9 transmission capacity and allow for cost-effective
10 transfer of energy in the southwest, as it was shared
11 in detail by Ms. Chang. This transfer capacity
12 increase will further facilitate the participation of
13 Arizona utilities in the EIM market, and also in the
14 upcoming EDAM market.

15 And as Ms. Chang shared, APS is already
16 recognizing -- is already participating in the EIM
17 market, and is recognizing the benefits. SRP and the
18 TEP will soon be participating and will be receiving
19 similar benefits for their participation.

20 Arizona utilities, by the way, have clearly
21 acknowledged the benefits of participating in the EIM
22 market, and the Ten West Link will allow for -- to
23 further expand -- expand the participation and the
24 value that Arizona utilities will receive from these
25 markets.

1 On the grid reliability front, as Member
2 Woodall indicated, it's a transmission asset that is
3 paralleling an existing transmission line, and a
4 transmission -- and it will become a part of the Path
5 46 or the west of river path. This path connects the
6 southwest and California -- southwestern United States
7 together and allows them to share their resources.
8 It's a high-voltage path.

9 Addition of a line to this path will not just
10 increase the capacity, but it will also allow for a --
11 for a higher capacity transfer, both under normal and
12 emergency-operating condition. Increased transmission
13 capacity will improve the system reliability by
14 reducing system stress under both normal and operating
15 condition, as I indicated, and the project will also
16 allow for increased operational benefits.

17 And as it was shared in Ms. Chang's testimony
18 this morning, that it will allow for the region to more
19 readily share resources and serve load. And it also
20 will allow for, you know, per the question of Member
21 Hamway, in case of an outage of a major resource or a
22 major transmission line in Arizona or California, it
23 will allow for a more robust system where the balancing
24 authorities, different balancing authority in the west,
25 can easily share resources and provide reliability to

1 their grid.

2 After reviewing the -- by the way, after
3 reviewing CPR, and that is The Comprehensive Progress
4 Report that was prepared by DCRT and submitted to WECC
5 as a part of our path rating process, and I'll go
6 through it in detail, we provided this information to
7 the ACC Staff as a part of the data request.

8 Ms. Little had concluded that provided the
9 Ten West Link is constructed in compliance with the --
10 compliance with and is operated in accordance with good
11 utility practice, the new line will not -- will not
12 have any negative impacts on the safety and
13 reliability, and will have no negative impact on the
14 delivery of power in Arizona. And that's a part of her
15 testimony that she submitted.

16 So Ten West Link will -- you know,
17 construction of the Ten West Link will provide tangible
18 nonspeculative and quantifiable economic benefits to
19 Arizona. Ten West Link, as we had shared before, Ten
20 West Link will facilitate the development of new
21 resources, resources in Arizona, that will bring
22 high-paying local jobs, as well as provide indirect
23 benefit to the regions.

24 We had already shared that there is over
25 4,150 megawatts of solar and solar PV projects -- solar

1 PV and solar PV plus storage projects that are
2 proposing to connect directly to the Ten West Link
3 project, as well as approximately 900 megawatts of
4 active project requests that are proposing to connect
5 directly to Delaney 500 kV bus. The project -- and by
6 doing so, it will bring new jobs and new economic value
7 to the local areas. The project will also allow the
8 Arizona utilities to serve their load in a most
9 cost-effective manner.

10 Finally, the environmental impacts. Ten West
11 Link, as you saw in the virtual tour yesterday and as
12 it will be covered in further detail by my colleague,
13 Mr. Lowell Rogers, will completely avoid the Kofa
14 Wildlife Refuge. That was one of the major concerns of
15 the ACC for the DPV2 line.

16 In addition, approximately 62.5 miles of DPV2
17 parallels the existing DPV -- Ten West Link parallels
18 the existing DPV line. By matching the towers on that
19 parallel path between DPV and Ten West Link, as well as
20 using the same access roads that are already built for
21 DPV line, Ten West Link will minimize both visual, as
22 well as environmental concerns -- will minimize both
23 visual and environmental impacts of the project.

24 The proposed route for Ten West was developed
25 after an extensive permitting process designed to

1 mitigate visual, biological -- biological impacts, as
2 well as avoid population centers.

3 CHMN. CHENAL: Member Gentles.

4 MEMBER GENTLES: So I'm going back to the
5 order denying the CEC, the prior one, which I assume
6 this is based on --

7 MR. AMIRALI: Yes, sir.

8 MEMBER GENTLES: -- to try and answer.

9 MR. AMIRALI: Yes, sir.

10 MEMBER GENTLES: So you have four points that
11 you have summarized the differences between then and
12 now. And then when I read this, there are 25 findings
13 of fact in here. So in those four summary -- so I
14 assume that these 25 findings of fact are organized on
15 each one of those, that you've addressed all of them,
16 or am I incorrect in assuming so?

17 MR. AMIRALI: Those, we basically lump them
18 into four major categories.

19 MEMBER GENTLES: Right, okay.

20 MR. AMIRALI: So any of them can fall in one
21 or a variety.

22 MEMBER GENTLES: But generally, if I'm
23 reading -- I'm interpreting what you've said there to
24 basically mitigating what these findings of facts were
25 in the previous CEC.

1 MR. AMIRALI: That was the intent, Member.
2 And it is -- I also reviewed the testimony by the ACC
3 Staff in our filing, and it closely mirrors what we
4 have provided in here.

5 MEMBER GENTLES: And then when it comes to
6 the wildlife refuge, even though the line doesn't cross
7 it, it's fairly close, wouldn't you say?

8 MR. AMIRALI: It is -- yeah, it is close.

9 MEMBER GENTLES: So it's within striking
10 range, right?

11 MR. AMIRALI: Only on one corner.

12 MEMBER GENTLES: It's pretty close, right?

13 MR. AMIRALI: Only on one corner.

14 MEMBER GENTLES: So even -- and I don't --
15 are there any known impacts as a result of it being
16 that close, even though it doesn't bisect or intersect
17 with the...

18 MR. AMIRALI: Member Gentles, I hope that you
19 have heard that story between Einstein and his
20 chauffeur?

21 MEMBER GENTLES: Remind me.

22 MR. AMIRALI: Well, anyways, a very Reader's
23 Digest version of it is, Einstein, after his theory of
24 relativity, went to so many places, that one day his
25 chauffeur said, you know, I've heard you repeat the

1 same thing so many times that I can recite it verbatim.

2 So Einstein gave him the opportunity, because
3 in the university he was going, nobody knew about him.
4 And the chauffeur went, delivered the presentation.
5 But when he was coming out, a professor asked him a
6 question and said -- and that was full of equations.
7 And the chauffeur looked at him and goes, this is very
8 simple and I'm surprised that you can't see the obvious
9 answer. It's so simple that my chauffeur can answer
10 it.

11 So the question you asked, I'm referring to
12 my chauffeur, sir.

13 MEMBER GENTLES: Okay. All right,
14 Mr. Chauffeur.

15 MR. ROGERS: Yes, the U.S. Fish and Wildlife
16 Service was concerned about the line going through
17 Kofa. Yes, they reviewed a Biological Assessment that
18 was done for the proposed alignment. And they
19 concurred with the findings that any impacts on the
20 pronghorn population in Kofa would be mitigated.

21 The range area of the pronghorn actually
22 isn't in the vicinity, the very corner there. You can
23 see -- I'll use my fancy chauffeur laser beam. Right
24 there, this corner here. In this area, this isn't a
25 typical ranging area for this sensitive species, so we

1 have mitigation in play here.

2 If there is potentially pronghorn in a
3 certain distance of construction activities, we'll
4 cease construction activities during that time. But we
5 have protocols that have been agreed upon by the
6 service to avoid impacting the wildlife on Kofa.

7 Does that answer your question, or can I turn
8 it back to Einstein?

9 MEMBER GENTLES: That will do for now.

10 MR. ROGERS: And I plan to go into this issue
11 in much more depth later, how this developed through
12 the NEPA process, how it was analyzed, and what the
13 results were.

14 MEMBER GENTLES: And then do you plan to also
15 address the issues that the Colorado Indian Nation
16 brought up as a result of this potential line siting?

17 MR. ROGERS: I can address all of those
18 issues. And if I don't cover it in my presentation,
19 please remind me and I'll get to it.

20 MEMBER GENTLES: Okay, thank you.

21 CHMN. CHENAL: Member Haenichen.

22 MEMBER HAENICHEN: Thank you, Mr. Chairman.

23 Yesterday the Chairman handed out a document
24 to everyone on both sides, and it's regarding this 2006
25 Devers line that was rejected by the Commission after

1 being approved by the Line Siting Committee.

2 Now, I'm not going to read the whole thing to
3 you, because it's seven pages long. But I think that
4 there are many, many more things in here that the
5 Commission objected to that have not been, to my liking
6 at least, addressed by the Applicant.

7 So I still -- I'm not convinced that there's
8 enough differences between these two projects to
9 warrant approval at this point, and that's why I'm
10 asking for more information that has not -- I have not
11 received as yet. So after I get that, I'll be more
12 informed. But I think everybody should read these
13 seven pages today and soak it up.

14 MEMBER WOODALL: Mr. Chairman.

15 CHMN. CHENAL: Member Woodall.

16 MEMBER WOODALL: I would also recommend that
17 you look at the discussion on economical on Pages 3
18 through 4 of Decision Number 69638, because they
19 discuss the economic benefits as being that, many of
20 them very similar to what has been put on the record
21 here, as being hypothetical and speculative, and that
22 they are not relevant to the prescriptions of ARS
23 40-360.07(B), and therefore finds -- so they basically
24 reject it, the economic benefits argument that was made
25 back then.

1 I'm not saying they're the same now, but I
2 think everyone should also read that one as well,
3 because we're getting a lot of evidence on economic
4 benefits.

5 CHMN. CHENAL: Member Gentles.

6 MEMBER GENTLES: So that's the premise of my
7 question. I mean, in aggregating your differences in
8 those four points, which -- you know, there's an awful
9 lot in this denial, that you've boiled down to these
10 four points.

11 And so, you know, I have no idea if, for
12 instance, what a side-by-side comparison would look
13 like, and the net positive or negative for this
14 application versus a prior one. So I wasn't here for
15 the prior one, so I'm just -- all I see is what I read
16 here.

17 So I have, you know, I just have to take what
18 you're telling me as fact, which that's fine, but I
19 just need to have a better understanding. And I think
20 that's probably what some of the Committee Members, and
21 maybe I'm the only one, is struggling with, which is,
22 what is the absolute net gain benefit as a result of
23 this new line versus what was denied previously.

24 And what you have told me is that that's what
25 it is right there, those four points. Am I -- is that

1 a fair assessment?

2 MS. GRABEL: Is that a question for me,
3 Member Gentles?

4 MEMBER GENTLES: I think there's a question
5 mark after that. Yeah, there was a question mark after
6 that question, yeah.

7 MS. GRABEL: Certainly. We will definitely
8 supplement what we have here in the record. I was just
9 examining the 25 points. I think, generally, we did
10 try to capture them under the four, just for ease of
11 presentation. But perhaps it would make more sense for
12 you and for other Members of the Committee if we
13 actually went item by item.

14 MEMBER GENTLES: It very well may be.
15 Because I've heard at least four questions up here
16 basically asking the same question.

17 MS. GRABEL: I understand.

18 MEMBER GENTLES: And we're not quite getting
19 enough information, especially from what Jack is
20 saying, we're just not getting enough information to
21 make a reasonable decision or have a reasonable
22 conversation about these points, because you're giving
23 us global answers to very specific denial points here
24 in this CEC.

25 MS. GRABEL: Certainly. So I think we're not

1 prepared to do that today, but we will be prepared
2 during the course of the hearing, and we'll do exactly
3 as you suggest.

4 CHMN. CHENAL: Let me just interrupt for a
5 second. I think some additional testimony that might
6 address point by point maybe the denial, including the
7 findings of fact, and maybe a slide or two that would
8 get into that, that way I think it would make it easier
9 to follow.

10 And, you know, I appreciate the question, I
11 appreciate, from your perspective, you may feel that
12 you've covered a lot of these with the testimony of
13 Ms. Chang and others or that will be presented, but I
14 think some summary exhibit that ties this all together
15 point by point would be effective.

16 MEMBER GENTLES: My point is, look, if we
17 don't understand it, the general public isn't going to
18 understand it. Or maybe the general public is more
19 informed about this decision and what's going on than
20 we are. But from what I can see, there really needs to
21 be some more articulated understanding about the real
22 specific differences between -- other than just the
23 general comments that are written up there, especially
24 when you had 25 issues that were brought up in the
25 statements of fact.

1 MR. AMIRALI: Member Gentles -- sorry.

2 MEMBER WOODALL: If I may, I think benefits
3 to the ratepayers, in terms of what they're going to
4 have to pay, is something that is contemplated by
5 40-360.07(B), and I think that's what the Commission
6 was saying in that paragraph.

7 I think the issues regarding economic
8 benefits, in terms of jobs and all the rest of this
9 stuff, I've never thought it belonged in these
10 proceedings. I understand we do it because it's
11 informative. But in terms of what our charge is, we
12 have statutory criteria that we do, and then the
13 Commission does the balancing, and the Commission has
14 said in this order what it considers to be relevant to
15 its determination with regard to economical.

16 So it's been very interesting; but from my
17 perspective, it's not necessary for the Commission to
18 do its business. I'm not saying it wouldn't be of
19 interest to them, and they may have changed their
20 perspective on this, but I don't think it's really
21 relevant if you use the language in this CEC -- in
22 Decision Number 69638.

23 MS. GRABEL: Member Woodall, I don't disagree
24 with you, and that's why the first portion of Brattle's
25 presentation was about the economical supply of power,

1 as opposed to the economic benefits that Arizona, as a
2 region, will accrue because of the project.

3 MEMBER WOODALL: I mean, none of that is in
4 our statutory criteria, and none of that is in
5 40-360.07. So personally, I am not inclined to take
6 that into account in my deliberations regarding your
7 proposal, because I don't think it's relevant, and I'm
8 just letting you know. I'm paying more attention to
9 how much it's going to save people paying for
10 electricity.

11 MS. GRABEL: And when you say that, Member
12 Woodall, you're speaking to the macroeconomic analysis
13 that Brattle did, as opposed to the more microeconomic
14 analysis associated with the cost savings that will
15 result from --

16 MEMBER WOODALL: All I care about is cost
17 savings to people who are buying electricity in this
18 state. I don't care about economic benefits to the
19 counties, because I don't think there's anything in our
20 statutory criteria about it. I mean, I know every
21 applicant puts this in, but I don't personally think
22 it's necessary. It may be informative, it may be
23 helpful; that's just me.

24 MEMBER GENTLES: Mr. Chair, I actually like
25 the fact that you're giving us economic benefit

1 analysis. I think that's really important, actually,
2 at least in my mind, because it helps me understand
3 more context around what this project means to the
4 state of Arizona, and then ultimately the people of
5 Arizona, right?

6 And I also do agree, though, with my
7 colleague that, yeah, so when it comes down to it,
8 ratepayers want to know what's this going to do for
9 them. Is it going to make my rate go up or down, and
10 how much is that going to be per year.

11 Right, Jack? Pretty much, right?

12 MEMBER HAENICHEN: Right.

13 MEMBER GENTLES: That's basically it, right?
14 So I think there is some room for economic benefit
15 analysis, without question; I like that. But I do
16 think, yes, ultimately we want to make sure, A, is this
17 increasing or decreasing people's monthly expense on
18 their APS bill, which I'm sure everybody here loves to
19 pay.

20 MEMBER HAENICHEN: Mr. Chairman.

21 CHMN. CHENAL: Yes, Member Haenichen.

22 MEMBER HAENICHEN: Regarding the statement
23 you just heard from my colleague here, it's not only
24 what it's going to do for us, but what it might do to
25 us. There might be very deleterious things, and

1 that's -- again, if you read this, you'll see what they
2 may or may not be.

3 CHMN. CHENAL: All right. So that was an
4 interesting exchange. But let me politely disagree
5 with Member Woodall on economics and the ability or
6 duty of the Committee to get into the issue of need.
7 Certainly the Commission can get into the issue of
8 need, and that is provided by ARS Section 40-360.07.

9 However, there is a Court of Appeals case
10 that was decided in 2005, the Grand Canyon Trust versus
11 ACC, which said, quote, "These factors" -- and it's the
12 factors that we generally rely on, ARS Section
13 40-360.06 -- "These factors contain sufficient breadth
14 to allow the Siting Committee to consider the need for
15 power as a factor in considering a CEC application
16 should it choose to do so."

17 We have done it in all the cases that I have
18 been involved with, and I think we should consider it
19 going forward, the need for the power. Now, in this
20 particular case, because that was the basis on which
21 the Commission overturned the Line Siting Committee
22 when it issued the CEC in the previous case, I think we
23 would not be doing our job if we didn't get into that
24 analysis, which the Court of Appeals specifically held
25 that we have the right to do, the power to do.

1 But in this case, in particular, I think it's
2 absolutely essential that we get into the need
3 analysis, because that's one of the primary bases on
4 which the Commission overturned the Line Siting
5 Committee in the last case. And I think we have to
6 create a very good record, point by point, of the
7 reasons that were announced by the Commission as to the
8 reason why it overturned the Line Siting Committee, in
9 order to create that record for the Commission to
10 adequately consider the case as it -- when it comes
11 back to them, because we're in the best position to do
12 that fact finding and that analysis and to create that
13 record.

14 And I think it's just beyond discussion
15 really that that's our obligation, and we should be
16 doing it. And in fact, we have been doing it for the
17 last almost day and a half, and we'll continue that
18 analysis through the conclusion of the hearing.

19 MEMBER WOODALL: Mr. Chairman, I was not
20 clear. I'm not talking about the economic analysis of
21 the value of the line. I'm talking about if someone
22 can tell me why jobs in La Paz County relates to the
23 need for the project, I would say, yes, we should
24 consider it, but I see no logical nexus. But we can
25 discuss this during deliberations.

1 CHMN. CHENAL: All right. So I think where
2 we left off, I think we would appreciate kind of a
3 point-by-point discussion of the various points that
4 were raised by the Commission, and there's also the
5 narrative of the Commission as well. But I think it
6 would -- I think it would make a better record, and I
7 think it would be better for the Applicant when this
8 gets before the Commission, that these points are
9 addressed, that their findings of fact and the
10 narrative are addressed point by point. I think that
11 was the message I relayed to you.

12 MS. GRABEL: I think, Chairman, the best way
13 to do that is we do have additional testimony that we
14 will present relating to the environmental differences
15 between what we did under the NEPA process.

16 So I think the type of analysis you're
17 looking for will best be presented as sort of a summary
18 testimony at the end of the hearing that refers back to
19 the testimony you've already heard and allows you to
20 ask additional questions. And we will go point by
21 point with an exhibit through the prior decision.

22 CHMN. CHENAL: Yes. You have plenty of
23 opportunity to put that together and supplement as
24 necessary. That might be a very good way to do it.

25 MR. AMIRALI: Chairman Chenal, I just wanted

1 to go back real quick. And I think this relates to
2 what Member Gentles and Member Haenichen was mentioning
3 when it comes to point-by-point comparison.

4 For example, in the reliability part of the
5 declining the project in the DPV2 line, the Commission
6 sited that it asked for a RAS scheme to be installed or
7 a special protection scheme to be installed, and that
8 was considered to be an adding reliability concern.
9 Ten West Link will have no RAS scheme associated with
10 it, and so it does not share that concern.

11 Similarly, as I mentioned about Kofa, we
12 completely avoid Kofa. My colleague shared with you
13 that we already have a mitigation measure. So a
14 summary -- a summary of those comparisons, as long as
15 the Members do not mind reading the same thing over and
16 over again, because as I said, a lot of these --
17 several of these points can be lumped in, especially
18 the economic points, can be lumped into one category,
19 we should be able to provide that information.

20 MS. GRABEL: We won't summarize anymore.
21 We'll do it in exhaustive fashion.

22 CHMN. CHENAL: Good. All right. I think
23 you're actually pleasing some of the Members of the
24 Committee by saying that. Normally, that's not
25 necessarily the case. But I think, in this case,

1 that's what some of us are asking for.

2 MR. AMIRALI: All right. Move along, move
3 along. I talked about a couple of additional economic
4 benefits -- a couple of additional technical benefits
5 to APS associated with the interconnection. And I did
6 cover a part of it, a little bit of it yesterday as a
7 part of my testimony.

8 As a part of the interconnection of the line
9 to Delaney Substation, DCRT will install five new
10 breakers, and also will convert the existing ring-bus
11 arrangement at Delaney Substation to a
12 breaker-and-a-half configuration. This is -- a
13 breaker-and-a-half is a lot more -- a lot superior.
14 From a reliability perspective, it's a superior
15 configuration. And this conversion will happen
16 completely at the cost of DCRT.

17 In addition to having a more reliable 500 kV
18 bus at Delaney Substation, the new configuration will
19 also create additional interconnection points or tie
20 points or bays, so as to say, where generation projects
21 can connect, and that will create for a more economic,
22 as well as environmental-friendly interconnection for
23 these new projects.

24 So there is, in addition to -- in addition to
25 changing the configuration, DCRT has facilitated an

1 agreement between APS and CAISO for implementing a
2 split-bus arrangement at Delaney Substation. The
3 split-bus arrangement -- this split-bus arrangement
4 will be similar to the arrangement that APS and the
5 CAISO have had and implemented at North Gila
6 Substation.

7 Now, according to this arrangement, new
8 generation projects connecting to the east bus will be
9 a part of the APS BA, while those connecting to the
10 west bus will be a part of the CAISO balancing
11 authority. The arrangement will allow new generation
12 projects to interconnect at their substation without --
13 without -- at Delaney Substation at a lower cost.

14 Now, there's a little bit of an advantage
15 that APS gains by having the -- having the projects
16 connecting directly to the bus. So for example, if a
17 generation project that wants to be a part of CAISO
18 connects, let's say, 2 miles outside Delaney Substation
19 or the Ten West Link, it is completely a part of the
20 CAISO balancing authority. And the communication in
21 case of -- in case of any issue on the APS system, the
22 communication flow will have to go from ISO to the --
23 from APS to ISO and then to the generator, okay.

24 By having those projects directly connecting
25 to Delaney Substation, even though they are part of the

1 CAISO, there is -- a part of that arrangement is that
2 APS has direct control over those projects and can
3 simultaneously inform the generator owners, as well
4 as -- as well as the CAISO, and has full control over
5 that generation. This creates a more reliable -- more
6 reliable and a faster communications arrangement
7 between the two balancing authority and the new
8 generator owners.

9 CHMN. CHENAL: Mr. Amirali, one question. At
10 the bottom point, the arrangement will allow new
11 generation projects to interconnect without building
12 new substations immediately outside Delaney Substation.

13 MR. AMIRALI: Yes, sir.

14 CHMN. CHENAL: How far does that benefit
15 extend? In other words, is there a certain distance
16 from Delaney at which one would have to build a
17 substation to interconnect?

18 MR. AMIRALI: Sir, there is an economic
19 cutoff point, as you know, sir. Any generator that
20 wants to build a project that connects directly to
21 DCRT -- or, Ten West Link, will have to install a
22 breaker -- will have to build a breaker-and-a-half
23 substation, okay, because that allows for matching the
24 reliability of the line. And frankly, that has become
25 the new standard for 500 kV -- major 500 kV lines in

1 the west.

2 CHMN. CHENAL: I'm not understanding. You
3 mean even someone who's going to generate and connect
4 at Delaney will have to also build a
5 breaker-and-a-half?

6 MR. AMIRALI: No, they don't, sir. All they
7 have to do is they have to build a gen-tie direct --
8 because Delaney will now be a breaker-and-a-half
9 arrangement, all they have to do is build an extension
10 cord.

11 CHMN. CHENAL: So do you have any idea of how
12 far away that would be economically viable as an
13 advantage, versus at some point pay saying it's more
14 cost effective to just go ahead and build a substation
15 to interconnect?

16 MR. AMIRALI: Mr. Chairman, I can give you
17 some rough ideas; again, because the decision
18 ultimately has to be more than just economic, it has
19 got a lot of facets to it. That includes
20 environmental, right-of-way, how many properties they
21 have to traverse.

22 But purely looking at economics, for a
23 couple-of-hundred-megawatt breaker-and-a-half
24 arrangement, just on the utility side, you are looking
25 at anywhere from 15 to \$25 million just for their

1 substation. And then you can, you know, calculate as
2 to how long the cost is for building the gen-tie line
3 and compare the two.

4 CHMN. CHENAL: Okay, thank you.

5 Member Haenichen.

6 MEMBER HAENICHEN: Now that we're talking
7 about people building new generation and connecting
8 into this line, and the implication at least of this
9 proceeding so far is that these would all be PV,
10 photovoltaic, and those are, of course, DC generators.
11 And so there's an additional large cost associated with
12 making that into AC before you go into the line. No?

13 MR. AMIRALI: Member Haenichen, the PV
14 generates AC, but it is converted at low voltage using
15 inverters right there. So when you hear the cost of
16 production, the cost of the inverters are already
17 included in the balance of plant cost, so the PV
18 installed cost now already accounts for that.

19 MEMBER HAENICHEN: I know, but it's been paid
20 for, so it's still a cost associated with hooking up to
21 this line with a DC generator.

22 MR. AMIRALI: Member Haenichen, we run --
23 western system has a -- it's a predominant AC system,
24 and actually, the United States is predominantly an AC
25 system.

1 MEMBER HAENICHEN: I know that.

2 MR. AMIRALI: Okay. Even if this line was
3 DC, you can't connect a DC to a DC; it doesn't exist.
4 That interconnection does not happen. DC does not
5 allow for interconnection to a DC line directly.

6 MEMBER HAENICHEN: I must have not made
7 myself clear. I know that this is an AC line, and I
8 know that the PV generates a DC energy system and it
9 has to be converted with an inverter in order to
10 connect, and that's the cost I was speaking about, and
11 it ain't cheap.

12 MR. AMIRALI: Actually, I would respectfully
13 disagree with that, sir. And just to add, sir, the
14 rooftops have to do exactly -- solar on the rooftop has
15 to do exactly the same as well.

16 MEMBER HAENICHEN: Yeah, at a very, very low
17 power level, so the inverter is very cheap.

18 MR. AMIRALI: The inverter -- actually, the
19 power level at which the conversion happens is actually
20 a lower voltage. Because it happens not on the 500 kV
21 level, it happens at the lower level, 600 volts or a
22 thousand volt bus level, which is a very low level.

23 I'll give you an example, sir. Today, the
24 price of solar PV at which the -- and again, I don't
25 know exactly what contracts are being signed, but the

1 published prices for solar PV that are being bought is
2 \$24 -- \$24 a megawatt hour, or 2.4 cents, and that's
3 the cost of solar energy that is being procured by even
4 Arizona utilities right now. And actually, that price
5 may be even high. That was the last RFP. And again,
6 these are the published prices or estimates of the
7 published prices, which is extremely cost effective.

8 Solar PV has almost become a parody right
9 now, and it's cost competitive. So the switch that is
10 happening from thermal resources to renewable
11 resources, it was first facilitated by the regulation,
12 but it has now become an economic switch. The Navajo
13 Generating Station -- in those cases, Arizona Public
14 Services is on record to indicate that it was not
15 cost -- it was a cost-effective decision, rather than
16 any kind of a policy decision for them to procure
17 energy.

18 So I would be more than happy to share
19 information regarding what are the prices of solar
20 power, but the price of inverters is already included
21 in it, and it's a part of the interconnecting a DC
22 generating system to the AC operating grid.

23 MEMBER HAENICHEN: Okay.

24 MR. AMIRALI: So now I will get into a little
25 bit on the WECC path rating process and the technical

1 studies that were performed for the project.

2 So as we had indicated, the Ten West Link
3 will become a part of the WECC east of river -- or,
4 west of the river path, it's also called Path 46, and
5 east of the river path, which is also called Path 49,
6 and will increase the rating of both the paths.

7 Now, a transmission path consists of one or
8 more transmission lines. Each line that constitutes
9 the path will have its own power rating, however -- a
10 power rating based upon the size of the wire that it
11 uses. However, a path rating is the simultaneous
12 rating of the entire path, and it's the transfer
13 capability of the entire path.

14 So a WECC path rating process is a formal
15 process, and it is engaged in by the developers of
16 transmission lines to get an accepted path rating and
17 demonstrate how their project will meet the NAERC
18 reliability standards and WECC criteria.

19 The path rating process consists of
20 performing technical analysis, having them reviewed by
21 the members of WECC, and receiving a formal approval.
22 The entire process is split in three phases. And as
23 you know, we are engineers, and we pride ourselves in
24 assigning very descriptive labels to our activities.
25 So we call those three phases Phase 1, 2, and 3.

1 In Phase 1, the Applicant performed detailed
2 studies using WECC-approved base cases, and these
3 studies are performed using WECC study parameters and
4 approach. And we prepare what is called a
5 comprehensive progress report and submit it to the WECC
6 for approval.

7 In Phase 2, a project review group comprising
8 of WECC members is formed, and then they review the
9 studies performed by the developer and request more
10 analysis, if needed. It is the responsibility of the
11 project developer to perform all of the studies and
12 address the comments and concerns of the program review
13 group.

14 Finally, in Phase 3, the studies performed in
15 Phase 2 are reviewed, approved, and the final path
16 rating is assigned. In addition, updated studies can
17 be performed in Phase 3 to validate the accepted rating
18 if any condition studied in Phase 2 have changed.

19 To complete the WECC path rating analysis and
20 to perform all of the detailed technical analysis for
21 Ten West Link, DCRT recruited the services of Mr. Peter
22 Mackin of GridBright, Inc. Mr. Mackin is one of the
23 leading transmission experts in the WECC, with over 36
24 years of expertise in the transmission planning arena.
25 Mr. Mackin performed transmission analysis to determine

1 the additional capacity associated with the Ten West
2 Link to complete the WECC path rating process, and to
3 assess the reliability and operational benefits
4 associated with the project.

5 As related to the status of our project, the
6 Phase 1 of the path rating process and other technical
7 assessments simulating different grid conditions to
8 qualify the transmission capacity increases associated
9 with the project has been completed. Mr. Mackin
10 completed the required technical analysis using the
11 WECC-prescribed approach and criteria, and has
12 completed the comprehensive progress report and will
13 submit it to WECC for approval.

14 We are currently in Phase 2A of the process.
15 The project review group has been formed. It's
16 comprised of different utility -- members from
17 different utilities across the southwest, including
18 Arizona utilities, by the way. And we have received
19 input and comments from the project review group and
20 are in the process of incorporating them in our
21 studies. The path rating process for the project is
22 expected to be completed around the end of Q3 2020.

23 As I indicated, the WECC process is a
24 well-prescribed process, and it assigns very tight
25 boundaries on the approach that can be used, the system

1 conditions that can be studied as a part of the
2 technical analysis.

3 For example, the WECC requires that all
4 projects that enter the WECC -- WECC path rating
5 analysis, prior to the project being studied, have to
6 be assumed to be online, irrespective of their status,
7 as such, to study other variables and frankly to create
8 a more realistic system condition.

9 Other technical analysis and simulations --
10 technical analysis that model different operating
11 conditions were also performed, you know, we had
12 performed the studies using different planning
13 conditions as well, to get a more realistic picture of
14 what the system is expected to be.

15 The results of the WECC path rating studies
16 and other studies performed to qualify technical
17 benefits have indicated that Ten West Link will
18 increase the path rating of both the east of the river
19 and the west of the river path.

20 And by the way, whenever I say "river," it's
21 Colorado River, okay, just to make sure.

22 CHMN. CHENAL: Mr. Amirali, why are there
23 different capacity increases depending whether it's
24 east or west?

25 MR. AMIRALI: Sir, they are both different

1 paths. So east of the river path and west of the river
2 path are different.

3 CHMN. CHENAL: A path, again, is what?
4 Because it's not one line.

5 MR. AMIRALI: It's not one line, sir. It is
6 a group of lines. And I will be more than happy to
7 share. For example, the west of the river path, Path
8 46 that we are talking about, has got -- please don't
9 quote me -- I believe seven lines right now, and this
10 will be a part eight. So it's either six or seven, and
11 I can provide you the list of those lines.

12 So it is the -- it is the simultaneous rating
13 of all of those lines. Now, one thing that you cannot
14 do, which is very intuitive, is to say, okay, you know,
15 Ten West Link has the capacity of 3,200 megawatts.
16 Devers Palo Verde line has a capacity of 3,000
17 megawatts, say. And Lugo Eldorado has a capacity of
18 4,000 megawatts. And if they are comprising a path,
19 let's add them all together.

20 Well, that's not how it works. It's not an
21 algebraic sum of the rating of the individual lines,
22 but it's rather the simultaneous rating of what can
23 flow on the path. And by the way, it is very important
24 to note that when you do a path rating analysis, what
25 you do is you take the worst-case contingencies, okay.

1 So you take -- in the WECC path rating analysis, you
2 model a system based on the WECC parameters that they
3 prescribe of the studies. Then you look at the -- look
4 at the system under normal and then you take the worst
5 condition.

6 And under the worst condition, you take the
7 outage of the worst element and see how the flows
8 distribute and where the overloads happen based upon
9 the criteria that WECC prescribes, and that is what
10 determines what the total all of the lines on the path
11 can carry.

12 That's where Ten West Link will also shine,
13 in that, by adding a new line to a critical element of
14 the west of the river path and east of the river
15 path -- before Ten West Link if you -- if one -- if
16 that element went away, for example, your loss of the
17 path rating would have been approximately anywhere
18 between 219 megawatts to 2,175 megawatts, as I have
19 stated there. After building the thing, okay, your
20 maximum loss is going to be 550 megawatts.

21 So it adds to the -- it adds -- in the
22 reliability case, it increases the reliability, because
23 now it makes the path more robust, and it can
24 withstand -- it can withstand an outage.

25 CHMN. CHENAL: So is it fair to say that a

1 path rating maybe has a little more to do with
2 reliability and less with actual capacity? In the
3 sense that you're building a line that's supposed to be
4 able to carry 3,600 megawatts, so the path rating seems
5 like it's a number that's derived from an analysis that
6 looks at worst-case basis, but you have a line that
7 still allows potentially 3,200 megawatts.

8 MR. AMIRALI: Sir, but we are now in the
9 danger of traversing back into the scheduling dialogue,
10 because the scheduling -- the way you schedule the
11 powers, the import limits and all, are determined by
12 the -- are impacted by path rating analysis,
13 simultaneous ratings. So it is a -- it is all
14 connected. So that's...

15 CHMN. CHENAL: So the more I learn, the more
16 questions I have, which is dangerous. But the path
17 rating, then, when you consider the total flows, one
18 should think in terms of path flows, as opposed to
19 individual line flows?

20 MR. AMIRALI: That is correct.

21 CHMN. CHENAL: And the path flows for Path,
22 well, 46 --

23 MR. AMIRALI: Doesn't matter.

24 CHMN. CHENAL: Doesn't matter. But the path
25 flows, with the addition of this line, will increase by

1 a 1,050 megawatts for east and 550, depending on one
2 analysis, heading west, even though the capacity of
3 this individual line is more than that?

4 MR. AMIRALI: Uh-huh, that is correct. It's
5 the path rating will increase, so that means the whole
6 path can now carry more -- has more capacity to
7 transmit more power on the entire path. So on the
8 simultaneous basis, you can carry more on the entire
9 path.

10 CHMN. CHENAL: So, but as you said, for the
11 purposes of scheduling, that's what's important.

12 MR. AMIRALI: Yes, sir.

13 CHMN. CHENAL: So that is the increase that
14 we are concerned with. Not the capacity of the line,
15 but the increase of the path.

16 MR. AMIRALI: Actually, it's both. The
17 capacity of the line -- for example, the capacity of
18 the line, when you do individual generator
19 interconnections, you determine that -- you use the
20 capacity of the line. When you use -- when you look at
21 WECC grid -- and as I said, it's a very prescribed
22 process in what WECC wants you to look at.

23 And I'm sure Ms. Little can tell you a heck
24 of a lot more about it than I can. And that when you
25 look at the WECC studies, you look at -- and you're

1 looking at a path rating analysis, then you look at all
2 of them put together.

3 CHMN. CHENAL: Member Woodall.

4 MEMBER WOODALL: Ms. Chang, are you going to
5 be here tomorrow?

6 MS. CHANG: I actually was planning to --

7 MEMBER WOODALL: Depart, okay. I'm just
8 going to put something on the record now, and I'm going
9 to say, during my deliberations with respect to this
10 project, I will not be taking into account your
11 economic stimulus impact studies, which I believe were
12 described as micro --

13 MS. CHANG: Macro.

14 MEMBER WOODALL: Macro. I'm not going to be
15 taking them into consideration because, one, I don't
16 believe they're relevant to these proceedings, and two,
17 I think they're highly speculative. No offense to you.
18 I understand you used a well-accepted model. But I do
19 find the model that you did on the economic benefits of
20 the project that relate to actual electricity cost to
21 be relevant, and I will take those into consideration.

22 And I just wanted to tell you that in case
23 someone said, no, no, no, you must take them into
24 consideration. But I'm not going to, unless I get a
25 vigorous argument why I should.

1 (No response.)

2 MEMBER WOODALL: I hear no argument, so thank
3 you. I just wanted to let you know in advance, and I
4 don't want you to be offended by that. It has to do
5 with what I think is relevant. Thank you.

6 MS. CHANG: Yeah, I take no offense.

7 MR. AMIRALI: So the summary of the results
8 of our technical analysis and those that were performed
9 using different system models that we believe to be
10 more realistic are listed on this -- on the slide.
11 West of the river -- or, west of Colorado River, Path
12 46, increase under WECC -- WECC path rating cases was
13 1,050, and east of the river was 550 megawatts.

14 Now, just to put it in perspective, 1,050 --
15 or, a traditional combined cycle generating plant used
16 to be -- which was a typical configuration, was two by
17 one. And a two by one plant was typically about 550
18 megawatts. So that means that on the whole path, whole
19 additional flow from an additional gas project could
20 have happened, okay.

21 From a solar perspective -- solar project
22 perspective, typical solar plus storage projects are
23 anywhere from -- two large ones that are being proposed
24 in Arizona are 200-plus megawatts. That's -- you know,
25 1,050 is four of those.

1 So as I said, we also used some more
2 realistic cases that we think, as far as the system
3 condition, to study different system conditions for
4 this project, and the path rating increases were much
5 higher in those cases.

6 For example, on Path 49, the capacity -- and
7 this is only the increase -- is 650. And it also
8 reduced the curtailment under outage condition on Path
9 49 between 219 and 2,175 megawatts, depending upon what
10 line outage condition we were studying. So all in all,
11 the project was adding to the reliability and the power
12 transfer capacity of the western grid.

13 That concludes my formal presentation. I'll
14 be more than happy to continue to answer questions.

15 CHMN. CHENAL: Member Drago.

16 MEMBER DRAGO: I appreciate you all's
17 testimony. As I've gone along here learning more and
18 more about this, would an example of the benefit for
19 this arrangement project, this type of arrangement, be
20 the PG&E issues they had with wildfire, where they had
21 to shut off electricity, but yet they were probably
22 still generating it and needed to offload that
23 generation? I'm just thinking about it, you know.

24 MR. AMIRALI: Member Drago, that's actually a
25 little bit of a different scenario, because the

1 wildfires and PG&E would be localized. That was a
2 localized concern, so it only affected one particular
3 area.

4 Now, you can create a hypothetical on PG&E
5 where, let's say that PG&E was a utility, even though
6 they own very little generation right now. But let's,
7 for the sake of argument, assume that the wildfires
8 impacted an area where a very large hydro generator
9 owned by PG&E was located. So when they shut off power
10 to that area, and let's assume that it impacted the
11 transmission line, and it shut off the generator as
12 well. Now, all of a sudden, the utility found itself
13 short on power. And if you had --

14 So any region in the interconnected grid --
15 so the only grids in the U.S. that are not fully
16 interconnected are Texas, Alaska, and Hawaii, okay? So
17 interconnected grid, the load is served by a
18 combination of in-area generation and imports. And
19 imports come from outside the area.

20 So a transmission line affects the ability to
21 import power and export power. You can import when you
22 are short, you can export when you are long, all right?
23 It also allows for, in organized markets or in
24 interconnected markets like Arizona and California, it
25 also allows the regions to make economic decisions

1 regarding whether to generate or whether to buy.

2 And so that's what the transmission offers,
3 it offers the flexibility. It offers the ability to
4 make a -- the more robust system you have, the more
5 ability you have to serve the load. And I'll give you
6 a more draconian example for that matter.

7 In Arizona, you guys have -- you guys do have
8 local areas that are served by -- that are constrained,
9 and this is only in Arizona, that are constrained by
10 transmission capacity coming in. And for those areas,
11 you have what is called RMR resources, or reliability
12 must-run generators.

13 The reliability must-run concept was created
14 for that particular purpose. Under that scenario, you
15 designate these resources as reliability must-run
16 because, in the absence of that kind of a designation,
17 these local resources have what is termed as a local
18 market power.

19 Because, you know, if it was a truly open
20 market, you know, that resource can decide, you know
21 what? You need me to run no matter what happens. So
22 guess what? You are going to pay me load, you're going
23 to pay me a thousand dollars a megawatt hour or a
24 thousand dollars a megawatt just to be available for
25 you, whether you need me or not.

1 So you can fix it by building more
2 generation, or you can build another transmission line
3 and address this concern. A bulk transmission line
4 addresses that concern on a global scale, and that's
5 what this line is doing.

6 MEMBER WOODALL: Is that called a reliability
7 must-run generation?

8 MR. AMIRALI: Yeah, for local areas they were
9 called reliability must-run. Arizona has them.
10 California, during the California -- early formation of
11 California, we had the -- California ISO had
12 reliability must-run generators.

13 MEMBER WOODALL: Thank you. Thank you.

14 CHMN. CHENAL: Any further questions from the
15 Committee?

16 (No response.)

17 CHMN. CHENAL: Mr. Arias, do you have any
18 questions.

19 MR. ARIAS: Staff does have a couple
20 questions.

21 CHMN. CHENAL: Sure.

22

23 RE CROSS-EXAMINATION

24 BY MR. ARIAS:

25 Q. Hello. Could you answer just, did DCR or

1 CAISO submit the Ten West Link project to WestConnect
2 as an interregional transmission project?

3 A. (BY MR. AMIRALI) So DCRT did not submit the
4 project. However, California ISO is a part -- is a --
5 California ISO, as a balancing authority, coordinates
6 all its efforts with all of the regional
7 transmission -- interregional transmission studies, and
8 have been in communication with them. It was not a
9 part of the 2000 -- I believe 2019 study. But, you
10 know, the CAISO has been discussing the projects with
11 WestConnect.

12 I do want to add that I have done
13 presentations, at least two myself and one by my
14 colleague, to SWAT for this project, Southwest Area
15 Transmission Group, for this project, and we continue
16 to provide them regular updates on the project as well.

17 Q. Okay, thank you. Just a couple more
18 questions to clarify the record.

19 Since the balancing authority for the Devers
20 Palo Verde Line 1 is under the CAISO balancing
21 authority, are there any generators that are connected
22 to that line that are also under the CAISO balancing
23 authority?

24 A. (BY MR. AMIRALI) I will check. However, I
25 do not believe that there is a direct interconnection

1 of any resource to DPV1.

2 Okay, let me backtrack. I don't believe that
3 there is any generator right now that is connecting
4 directly to the Palo Verde Colorado section of Devers
5 Palo Verde line, but please allow me an opportunity to
6 verify and let you know.

7 Q. Okay, thank you. So any -- the generators
8 that connect to the Ten West Link line, will they be
9 under the CAISO balancing authority?

10 A. (BY MR. AMIRALI) The generators that
11 connect to the line will be under -- because the --
12 because the ISO's jurisdiction will be between the west
13 bus at Delaney Substation and -- westbound starting the
14 west bus of Delaney Substation, any generator
15 connecting to the line will be part of the CAISO
16 balancing authority.

17 Q. Okay. So the westbound is the --

18 A. (BY MR. AMIRALI) West bus. So going from
19 Delaney west bus heading westward.

20 Q. Okay, towards...

21 A. (BY MR. AMIRALI) Towards Colorado River.

22 Q. Yeah, towards that.

23 A. (BY MR. AMIRALI) Yeah, the projects that
24 connect to the east bus will be a part of the APS
25 balancing authority. But I must add that even though

1 they are part of the CAISO balancing authority, these
2 generators have the ability to sell power and -- power
3 or energy to either Arizona or California, just like
4 any other resource that may be located on Oregon
5 border.

6 Q. Okay. So will these generators be required
7 to sign any contracts with CAISO?

8 A. (BY MR. AMIRALI) They will sign the same
9 agreements with the ISO, they are participating
10 generator agreements. They will execute -- for
11 interconnection, they will execute large generator
12 interconnection agreement. They will become a
13 participating generator with the ISO. They will
14 provide a schedule one, all the bells and whistles that
15 are required by any generation that is connecting to
16 the ISO system.

17 Q. And will these agreements obligate the
18 generators to make their generation available to CAISO
19 first in any emergencies?

20 CHMN. CHENAL: Can you repeat the question,
21 please, Mr. Arias?

22 BY MR. ARIAS:

23 Q. Yes. Again, will these agreements obligate
24 the generators connected to the Ten West Link line to
25 make their generation available to CAISO first in any

1 emergencies?

2 A. (BY MR. AMIRALI) May I consult with my
3 colleague one second?

4 Q. Yes, you can.

5 CHMN. CHENAL: Let me suggest we take a
6 really quick break. Because that's an important point
7 and I don't want to see you rushed on it, because I
8 know there's going to be some follow-up questions on
9 that question. Do you want to take a five-minute
10 break, or are you ready to go?

11 MR. AMIRALI: We can answer, sir.

12 So I think the question, if I understand
13 the -- extrapolating from your question, let's say that
14 this generator was selling energy to Arizona, and all
15 of a sudden, you want the -- they want to turn around
16 and sell the capacity to ISO. Is that your question,
17 sir?

18 MR. ARIAS: Hold on one second. I just want
19 to make sure that we get the question clear.

20 CHMN. CHENAL: Let's take that five-minute
21 break I was talking about.

22 (Off the record from 4:39 p.m. to 4:51 p.m.)

23 CHMN. CHENAL: Let's go back on the record.
24 I don't know how much time we're going to have here. I
25 want to make sure that we ask any follow-up questions

1 to Ms. Chang, because I understand she won't be here
2 tomorrow. I don't know if anyone has any, but we
3 should take advantage of that opportunity.

4 MS. GRABEL: And actually, Chairman, if I may
5 interject for a moment. We will make Ms. Chang
6 available, if the Committee would like, on Tuesday by
7 phone. Because we do want to introduce the exhibit
8 that Member Haenichen asked for, and it's possible
9 Ms. Chang will be the right witness to do that. So
10 you'll have another opportunity if something arises.

11 CHMN. CHENAL: That would be good, because it
12 could very well come out that we'll have some more
13 questions, and your expertise would be appreciated to
14 have the ability to ask questions.

15 MS. CHANG: Okay.

16 CHMN. CHENAL: Mr. Arias, did you have any
17 further questions? You were going to consult with your
18 witness and follow up with a question.

19 MR. ARIAS: Chairman, yes, I do.

20 BY MR. ARIAS:

21 Q. I think we'll start with the question that we
22 did figure out at the end, was whether in an outage
23 situation with CAISO, and the line is supplying power
24 towards Arizona, will the generators have to switch and
25 start providing power back to the CAISO transmission

1 network?

2 A. (BY MR. AMIRALI) Mr. Arias, can you define a
3 little bit further your parameter? What outage
4 condition are we talking about?

5 Q. In an emergency where the CAISO network is
6 resource short, there's a shortage of resources.

7 A. (BY MR. AMIRALI) So I would like to request
8 an opportunity to review some of the -- some of the
9 parameters around that, if that's okay, and provide the
10 answer.

11 Typically, every balancing authority has the
12 ability to cut exports, but they are under very
13 narrowly-defined conditions that are already specified
14 in the market rules. That is no different than APS
15 cutting the generation. Like I discussed with you that
16 there are generators that will be connecting to Delaney
17 bus. And if there is a problem with APS system, even
18 if it's not resource short, the APS can cut the -- turn
19 those generators down to mitigate that.

20 As a reliability entity, there are prescribed
21 situations in which that will be -- that is a
22 regulation that all the RCs are required to comply
23 with. But please allow me the opportunity to research
24 that a little further and provide you a response.

25 Q. That's fine. I guess just another follow-up

1 question. Same situation, emergency with a shortage of
2 resources, but now there isn't power going towards
3 Arizona. The flow is going towards CAISO, but not all
4 the generators are providing power towards CAISO.
5 Similar situation, just not giving power to Arizona.

6 Do those generators -- are the generators
7 going to be required to provide additional power
8 towards CAISO in order to meet that shortage of
9 resources?

10 A. (BY MR. AMIRALI) As a participating -- okay.
11 So this is -- again, there's a lot of ifs and what-if
12 scenarios involved in this one. But let's, for the
13 sake of argument, let's start with a very simple one,
14 and we can start adding variations and complications to
15 it, okay?

16 Let's say that there is a resource that is
17 purely market and that is connected to Ten West Link,
18 or for that matter, any other line, and it is offline
19 at this time. If this resource is purely market
20 resource, the ISO has the ability to ask that generator
21 to come online in case of a shortage. But again, there
22 are market rules under which that resource has to be
23 called, and that is an agreement that every balancing
24 authority, every transmission owner signs as a part of
25 their interconnection, and how they receive the

1 payments are all prescribed.

2 For resources that assign a resource adequacy
3 or a capacity contract with either California or a
4 load-serving entity -- any load-serving entity inside
5 California, they have a requirement to make their
6 capacity available in lieu of the payment that they are
7 receiving for a capacity contract.

8 So those rules are very well prescribed as a
9 part of the RA, or a Resource Adequacy Agreement. The
10 ability to call resources that are purely market
11 resources is based upon the ISO tariff, and it is
12 pretty well prescribed in the tariff. As I said, I
13 will get those sections of the tariff for you.

14 Q. Okay, thank you.

15 A. (BY MS. CHANG) I just want to add,
16 similarly, same thing for APS. Any utility that
17 contracts a resource -- basically think of it this way.
18 If you are paying for a resource to be available to
19 you, under particularly emergency conditions, they have
20 an obligation to be there, you know, as much as
21 possible, because you are paid for that resource.

22 The other thing to be cautious about, again,
23 I want to emphasize, transmission line is a
24 passive asset in this scenario. Whatever rules govern
25 the generation resource, where it belongs during an

1 emergency situation are typically guided by
2 interconnection agreements, depending on who you're
3 interconnecting to, market rules, and contractual
4 relationships. None of those things are affected by
5 which transmission line you are interconnected to.

6 Q. Okay. Just a final question, and this might
7 be also something that you go back to the agreements to
8 look at. Whether or not there's going to be any
9 operational requirements or constraints that are
10 imposed on generators that are signing the agreements
11 to connect to the Ten West Link line?

12 A. (BY MR. AMIRALI) Each generator is studied
13 as a part of the large generator interconnection
14 agreement. That is -- that is a part of large
15 generation interconnection process that we are going
16 through. The requirements on generators change as you
17 go through the queue clusters.

18 We have got generators that are proposing to
19 connect to the line in three different clusters now.
20 And as you move from -- those requirements change.
21 Operational constraints will be addressed as a part of
22 those studies.

23 MR. ARIAS: Okay, thank you.

24 MEMBER WOODALL: If I may, I believe we have
25 Exhibit DCR-26, which is a large generator

1 interconnection agreement. So perhaps Staff might be
2 able to tiptoe through that and find some answers.

3 MR. ARIAS: Yes, Member Woodall.

4 MEMBER WOODALL: Thank you.

5 CHMN. CHENAL: All right. Any follow-up
6 questions, Ms. Grabel --

7 MS. GRABEL: None from me.

8 CHMN. CHENAL: -- for Mr. Amirali or
9 Ms. Chang?

10 Does the Committee have any further questions
11 of Mr. Amirali or Ms. Chang?

12 MEMBER WOODALL: No, but I advise Ms. Chang
13 to run for the hills quickly before we come up with
14 some.

15 CHMN. CHENAL: Okay. It's 5:00 on the nose.
16 I think your next witness is going to be Mr. Rogers --

17 MS. GRABEL: That's correct.

18 CHMN. CHENAL: -- is that correct,
19 Ms. Grabel?

20 MS. GRABEL: That is correct.

21 CHMN. CHENAL: Maybe tomorrow would be the
22 time when we'd get into his testimony.

23 MS. GRABEL: Certainly.

24 CHMN. CHENAL: And then after we're finished
25 with him, then you're going to bring in the

1 environmental panel; is that correct?

2 MS. GRABEL: That is correct. However, I
3 know that Staff wanted to bring Ms. Little to testify.

4 CHMN. CHENAL: Yes.

5 MS. GRABEL: Whether she wants to start
6 tomorrow or go after the technical panel is complete,
7 I'd defer to Staff on that.

8 CHMN. CHENAL: Okay. Well, thank you for
9 that. We'll make sure we get Ms. Little in tomorrow.

10 How long do you think Mr. Rogers will be for
11 the second panel?

12 MS. GRABEL: His presentation isn't that
13 long, so it really depends on the Committee's
14 questions. It's really focused on infrastructure, the
15 type of poles, couple of slides on right-of-way that I
16 know there's been some questions about before. Maybe
17 an hour, that's about what I anticipated. We also
18 wanted to address Member Haenichen's interest in doing
19 a Google Earth flyover of the Palo Verde hub and the
20 other generation infrastructure around the Palo Verde
21 hub, and he was going to do that as part of his
22 presentation. I don't anticipate longer than an hour,
23 but you never know where it goes.

24 MEMBER WOODALL: And you were going to
25 address response to some of the comments, and I

1 specifically referenced the comments of one of the
2 supervisors of La Paz County. And you were going to
3 address it, I guess, in the larger context of how you
4 dealt with those.

5 MS. GRABEL: Yes, ma'am, we're going to do
6 that in the environmental section, because that's part
7 of the NEPA process and the stakeholder operation.

8 MEMBER WOODALL: Great, thank you very much.

9 CHMN. CHENAL: We can decide tomorrow, unless
10 Ms. Little has a preference as to whether she goes on
11 first or later. I mean, one of the benefits of going
12 later is she'll hear a little more testimony and may
13 have some more comment on what she sees or hears.

14 MR. ARIAS: Chairman, Staff has no
15 preference. Ms. Little is okay going after the
16 technical panel is finished.

17 CHMN. CHENAL: All right. Maybe we'll do
18 that.

19 So are there any other matters we should
20 discuss before we break for the evening?

21 (No response.)

22 CHMN. CHENAL: I want to thank Ms. Chang for
23 coming out here. I know we're going to have an
24 opportunity to ask questions of you on Tuesday; I look
25 forward to that. But I want to thank you for coming

1 out.

2 I know we asked a lot of questions and
3 interrupted your presentation. It's kind of like when
4 lawyers get before a Court of Appeals and they have a
5 presentation ready to go, and all of a sudden the
6 judges get in their way and ask a bunch of questions
7 and break up the flow of their testimony. But that's
8 just par for the course, the way we do it.

9 MS. CHANG: You're welcome.

10 CHMN. CHENAL: But I want to thank you for
11 that.

12 And I don't know how we're doing on time,
13 Ms. Grabel, in terms of your schedule.

14 MS. GRABEL: Cautiously optimistic.

15 CHMN. CHENAL: Cautiously optimistic.

16 MS. GRABEL: If we get through the technical
17 panel and Staff, and perhaps begin the environmental
18 panel tomorrow, we'll be good to go.

19 CHMN. CHENAL: All right. I think there will
20 be less issues with the environmental, given that the
21 Kofa reserve wilderness area is not going to be
22 impacted directly by it.

23 But anyway, if not, we'll adjourn for the
24 evening and see everyone tomorrow at 9:00. Thank you.

25 (The hearing recessed at 5:03 p.m.)

1 STATE OF ARIZONA)

2 COUNTY OF MARICOPA)

3

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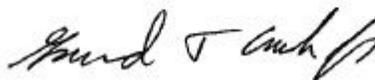
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