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January 11, 2019

#### Via Electronic Filing

Rosemary Chiavetta, Secretary PA Public Utility Commission P.O. Box 3265 Harrisburg, PA 17105-3265

Re: Application of Transource Pennsylvania, LLC Filed Pursuant to 52 Pa. Code Chapter 57 Subchapter G, for Approval of the Siting and Construction of the 230kV Project in Portions of Franklin County, Pennsylvania Docket No. A-2017-2640200

Application of Transource Pennsylvania, LLC filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the 230kV Transmission Line Associated with the Independence Energy Connection-East Project in Portions of York County, Pennsylvania Docket No. A-2017-2640195

Dear Secretary Chiavetta:

Attached for filing is a Motion of Stop Transource Franklin County to Designate Stricken Testimony Pursuant to the Sixth Prehearing Order to be filed in the above-referenced matter. Thank you.

**CURTIN & HEEFNER LLP** 

BY:

Joanna A. Waldron, Esq.

Counsel for Stop Transource Franklin County

cc: Per Certificate of Service

#### CERTIFICATE OF SERVICE

#### Consolidated Docket Nos. A-2017-2640200 and A-2017-2640195

I hereby certify that a true and correct copy of the Motion of Stop Transource Franklin County to Designate Stricken Testimony Pursuant to the Sixth Prehearing Order has been served upon the following persons, in the manner indicated, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a participant).

#### VIA E-MAIL & FIRST CLASS MAIL

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Date: 1/11/19

#### BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

Application of Transource Pennsylvania, LLC for approval of the Siting and Construction of the 230 kV Transmission Line Associated with the Independence Energy Connection - East and West Projects in portions of York and Franklin Counties, Pennsylvania.

A-2017-2640195 A-2017-2640200

Petition of Transource Pennsylvania, LLC for a finding that a building to shelter control equipment at the Rice Substation in Franklin County, Pennsylvania is reasonably necessary for the convenience or welfare of the public.

Petition of Transource Pennsylvania, LLC for a finding that a building to shelter control equipment at the Furnace Run Substation in York County, Pennsylvania P-2018-3001883 is reasonably necessary for the convenience or welfare of the public.

Application of Transource Pennsylvania, LLC for approval to acquire a certain portion of the lands of various landowners in York and Franklin Counties, Pennsylvania for the siting and construction of the 230 kV Transmission Line associated with the Independence Energy Connection –

East and West Projects as necessary or proper for the service, accommodation, convenience or safety of the public.

# MOTION OF STOP TRANSOURCE FRANKLIN COUNTY TO DESIGNATE STRICKEN TESTIMONY PURSUANT TO THE SIXTH PREHEARING ORDER

Stop Transource Franklin County ("STFC"), by and through its attorneys, respectfully files this Motion in the above-referenced Applications of Transource Pennsylvania, LLC ("Transource") and related proceedings, to Designate Stricken Testimony Pursuant to the Sixth Prehearing Order.

Your Honors issued the Sixth Prehearing Order on December 31, 2018, granting petitions for leave to withdraw eminent domain applications, striking certain witness testimony and amending the procedural schedule (hereinafter "Order").

Consistent with the Order, this Motion designates the testimony that should be stricken as improper because it is "direct testimony raised as rebuttal testimony" and contains "specific issues relating to reliability that should have been set forth in the siting applications." Order at ¶ 9, and p. 5.

#### I. BACKGROUND

On December 27, 2017, Transource Pennsylvania, LLC ("Transource") filed two
Applications for siting electric transmission lines, one proposed line for Franklin County, which is the subject of Transource's Application filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the 230 kV Transmission Line Associated with the Independence Energy Connection West Project in Portions of Franklin County,
Pennsylvania, docketed at A-2018-2640200 and one proposed line in York County, which is the subject of the Application filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the 230 kV Transmission Line Associated with the Independence Energy Connection East Project in Portions of York County, Pennsylvania, docketed at A-2018-2640195 (hereinafter, collectively, "Siting Applications"). Transource filed six (6) witness statements in its case-in-chief to support its Applications.

On May 15, 2018, Transource Pennsylvania, LLC ("Transource" or "Company") filed 133 eminent domain applications ("Eminent Domain Applications"), and two Petitions for findings that building to shelter control equipment at the proposed Rice Substation in Franklin County (Docket No. 2018-3001878, hereinafter "Franklin County Shelter Petition"), and for the

Furnace Run Substation in York County (Docket No. 2018-3001883, hereinafter "York County Shelter Petition") (collectively, "Shelter Petitions"). Prior to Transource filing its Siting Applications, on December 23, 2017, the Commission approved a settlement of Transource's application for certification under Docket Nos. A-2017-2587821 and G-2017-2587822, recognizing that Transource was "a new type of entity in this Commonwealth" that was formed solely to carry out a particular market efficiency project.

Eight public hearings were held in Franklin and York Counties in May of 2018. After Transource filed the late-added eminent domain applications, Administrative Law Judges Barnes and Calvelli issued a Third Procedural Order dated June 26, 2018, which permitted additional public input hearings in September of 2018 in Franklin and York Counties, and extended the due date for Direct Testimony to September 25, 2018. After all of the public input hearing were conducted, and the other parties' Direct Testimony was served, Transource filed its Rebuttal Testimony, which consisted of sixteen (16) statements.

The Sixth Prehearing Order addressed three Motions for an extension of the procedural schedule and/or to strike testimony. On December 7, 2018, the Office of Consumer Advocate (OCA) filed a Motion to Amend Procedural Schedule, and had requested a minimum of 90-day extension of time to submit Surrebuttal testimony. On December 10, 2018, Citizens to Stop Transource, York County filed a Motion to Amend Procedural Schedule, requesting a five-month extension for the deadlines, or in the alternative, to strike testimony. On December 13, 2018, STFC filed a Motion to Amend Procedural Schedule and Strike Certain Testimony.

The Sixth Prehearing Order granted the Motions of OCA, STFC, and the Citizens to Stop Transource in part, and denied the Motions in part. The Order provides is relevant part:

- 3. That the Office of Consumer Advocate's Motion to Amend Procedural Schedule is granted in part and denied in part.
- 4. That Stop Transource Franklin County's Motion to Amend Procedural Schedule is granted in part and denied in part.
- 5. That Citizens to Stop Transource, York County's Motion to Amend Procedural Schedule is granted in part and denied in part.
- 5. That the procedural schedule as amended by the Fourth Prehearing Order dated July 30, 2018 is amended as follows:

Surrebuttal Testimony
Written Rejoinder
Evidentiary Hearings
February 21-22 and
February 25 – March 1
Main Briefs
March 28, 2019
Reply Briefs
April 17, 2019

- 6. That landowners subject to applications for eminent domain who testified in person are given leave to serve written surrebuttal testimony on or before January 30, 2019 and written rejoinder testimony on or before February 11, 2019 to the parties and the presiding Administrative Law Judges.
- 7. That the motion to strike the rebuttal testimony of James Cawley is denied.
- 8. That the motion to strike the rebuttal testimony of Judy Chang is granted in part and denied in part consistent with the body of this Order.
- 9. That the motion to strike the rebuttal testimonies of Steven Herling, Kent Herzog and Stephen Stein is granted to the extent they are introducing direct testimony as rebuttal testimony consistent with the body of this Order.

Order at p. 7-8.

In response to the portion of the Order striking testimony, STFC conferred with counsel for Transource about designating specific testimony as being struck by the Order, with suggested page and line number designations. STFC and Transource did not reach agreement; however, the parties jointly agreed that any motion that STFC files seeking this relief be filed and answered on an expedited basis, in consideration of the ongoing procedural schedule. To that end, we respectfully request that this Motion be considered under an expedited schedule, rather than the 20-day response period under 52 Pa. Code § 5.103(c).

#### II. LEGAL STANDARD

Under the Commission's regulations, a request can be made by motion to relief desired, except as otherwise expressly provided for in the regulations. 52 Pa. Code § 5.103(a). Under 52 Pa Code § 5.483, the presiding officer has "the power to exclude irrelevant, immaterial or unduly repetitive evidence...to schedule...and to otherwise regulate the course of the proceeding." 52 Pa. Code § 5.483. Further, as set forth in the Order "the Commission's regulations also prohibit parties from introducing evidence at the rebuttal phase that substantially varies from the party's case-in-chief." Order at p.4. Further, the Order cites the Commission's regulations at 52 Pa. Code § 5.243(e), stating "a party is not permitted to introduce evidence during a rebuttal phase which is repetitive, should have been included, or substantially varies from the parties case-in chief." Order at p. 4.

# III. DESIGNATIONS OF TRANSOURCE REBUTTAL STATEMENTS STRICKEN BY THE ORDER

The Order "granted in part" both the STFC and Citizens to Stop Transource's Motions. See Order at Paragraphs 8 and 9. As discussed below, STFC identifies the following testimony as violative of the Order, and required to be stricken.

## A. The Rebuttal Statements of Herling, Herzog and Stein Violate the Order

Exhibit A identifies the testimony that the Order required be stricken, and which otherwise violates Order. The rebuttal statements of Herling, Herzog and Stein are to be stricken pursuant to Paragraph 9 of the Order, which states that "the motion to strike the rebuttal testimonies of Steven Herling, Kent Herzog and Stephen Stein is granted to the extent that they are introducing direct testimony as rebuttal testimony consistent with the body of the Order." Order at ¶ 9.

Mr. Herling offers rebuttal testimony, and adopts direct statements of Mr. McGlynn because Mr. McGlynn "changed his role within PJM." Transource St. No. 7-R at p.3. Mr. Herling did not adopt Mr. McGlynn's testimony until November 2018, even though the role change requiring the switch occurred in February 2018, nine (9) months earlier. Mr. Herling's rebuttal statement should have been introduced on direct. Mr. Herling introduces the prohibited topic of the "specific issues relating to reliability," as explained in the summary of his testimony: "While Project 9A was originally approved as a market efficiency project, it is now expected to provide specific reliability benefits because PJM has identified potential reliability violations that would be resolved by this Project." Statement No. 7-R. p. 6. As such, the entire rebuttal statement is to be stricken under the Order.

Transource Statement No. 11-R of Stephen Stein also violates the Order's prohibition on introducing direct testimony as rebuttal. Mr. Stein, the Director of Transmission Projects for American Electric Power, offers "rebuttal" testimony on "the cost, construction and schedule for the IEC project." However, Transource did not offer his testimony before in this proceeding. Mr. Stein could have offered testimony on direct about the reevaluation and cost updates that were certainly anticipated (albeit not completed) at the time the Application was filed. Likewise, the reliability benefits and the identity of the person affiliated with the Project who could offer

testimony to support the Application, should have been anticipated, before the Rebuttal Testimony.

The Order also requires striking Mr. Herzog's Rebuttal Statement. As discussed below, the Rebuttal Statement of Mr. Horger, not Mr. Herzog, contains significant prohibited direct testimony. STFC's Motion dated December 13, 2018 contained references to both the Rebuttal Statement of Mr. Horger and the Rebuttal Statement of Mr. Herzog. STFC suggests that in the alternative to striking Mr. Herzog's testimony in its entirety under the existing Paragraph 9 of the Order, that the Statement of Mr. Horger is to be stricken in its entirety.

# B. The Rebuttal Statements of Brian Weber, Kamran Ali, and Timothy Horger Contain Violations of the Order.

Certain portions of the rebuttal statements of Brian Weber, Kamran Ali and Timothy

Horger contain prohibited references relating to specific reliability issues that violate the Order.

The specific testimony that violates the Order, and should have been set forth in the direct testimony is contained in **Exhibit A**. Copies of the Statements of Brian Weber, Kamran Ali, and Timothy Horger, and an exhibit sponsored by Mr. Horger, identifying the stricken language is contained in **Exhibit B**.

Mr. Weber's testimony improperly discusses reliability in the context of his Need Issue No. 2. Mr. Weber states that Witness Herling, "will demonstrate that if the Project were not constructed this would cause multiple reliability criteria violations." Transource St. No. 1 at p. 5. Mr. Weber's reference to Mr. Stein, whose statement the Order strikes, is likewise to be stricken.

Witness Kamran Ali, has some prohibited references that must be stricken, because Mr. Ali's testimony references to reliability arguments that should have been set forth in direct.

Order at Page 5 ("However, specific issues relating to reliability should have been set forth in the siting applications and direct testimonies of Transource PA. Here, the Order strikes Mr. Ali's

discussion of adverse effects of chronic congestion beyond congestion costs, all of which could have been discussed in direct.")

Likewise, the testimony of Timothy Horger contains testimony on the Project resolving specific reliability benefits, which testimony must be stricken per the Order. As STFC explained in its prior Motion,

Transource offers two statements by PJM employees, Mr. Herling and Mr. Horger, both of which introduce reliability violations as the basis for the "need" of the project, For example, on p. 4, the last bullet point (lines 13-15) states "Without the inclusion of Project 9A into the PJM RTEP, the PJM region would incur increased costs and additional transmission upgrades would be necessary to ensure the reliability of the PJM region."

STFC Motion at p. 6.

The Order specifically concludes that in the direct testimony "no references were specified to suggest the project is necessary to resolve potential reliability violations or the provide reliability benefits." Order at 5. STFC explained that Mr. Horger's testimony contained some improper reliability statements in its Motion:

Transource offers two statements by PJM employees, Mr. Herling and Mr. Horger, both of which introduce reliability violations as the basis for the "need" of the project, as well as the Rebuttal Testimony of Mr. Ali, who now asserts for the first time that the IEC Project would remove "specific reliability violations" and addresses "local reliability needs." Ali, Transource Statement 2-R at p. 2-3.

As such, the references identified in Exhibit A need to be removed from Mr. Horger's Rebuttal Statement, to the extent the Statement is not entirely stricken.

### C. Rebuttal Statement of Judy Chang Is Revised per the Order

Transource St. No. 10 should be adjusted as indicated on Exhibit A, striking Ms. Chang's testimony in part, consistent with Paragraph 8. Exhibit A strikes the offending testimony and

maintains the permitted testimony "regarding employment and economic stimulus benefits" as set forth in the Order at p. 5. See Exhibit B, Judy Chang Statement No. 10-R.

#### IV. CONCLUSION

For all the foregoing reasons, STFC respectfully requests that STFC's Motion to Designate Stricken Testimony Pursuant to the Sixth Prehearing Order be granted.

**CURTIN & HEEFNER LLP** 

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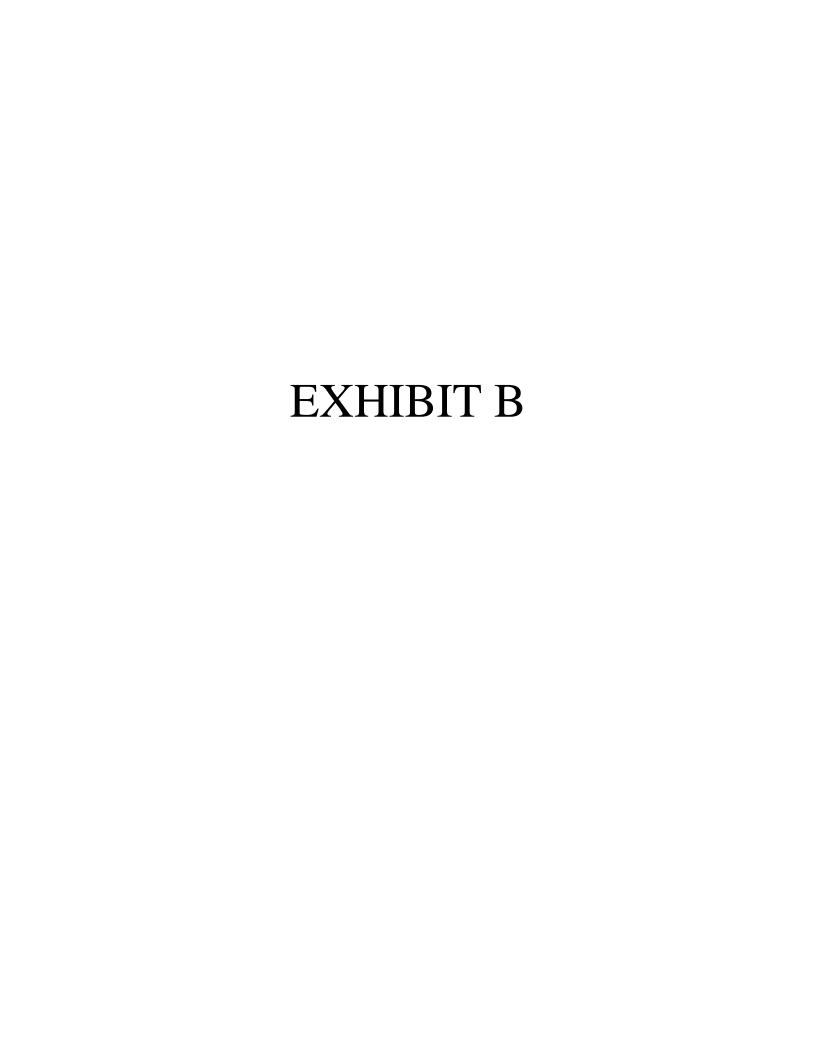
# **Exhibit A**

Stricken Testimony Transource Rebuttal Testimony				
Testimony	Witness	Page(s)	Line Number(s)	Note
Transource St. No. 7- R	Steven Herling	ALL		Per¶9
Transource St. No. 5-R	Kent Herzog	ALL		Per¶9
Transource St. No. 11-R	Stephen Stein	ALL		Per¶9

Part	Partially Stricken Transource Rebuttal Testimony					
Testimony	Witness	Page(s)	Line Number(s)	Note		
Transource St. No. 1-R	Brian D. Weber	5	15-23			
Transource St. 140. 1-10	Brian D. Weber	12	Ln. 20-22			
Transource St. No. 2-R	Kamran Ali	2-3	Pg. 2, Ln. 17 – Pg. 3, Ln. 12	Beginning after "benefits."		
Transource St. No. 2-K	Kailifali Ali	7-9	Pg. 7, Ln. 19 – Pg. 9, Ln. 7.			
		4	13-15	Fifth bullet point		
		6	Ln. 8	Strike "and reliability benefits"		
	Timothy Horger	7-13	Ln. 4- P.13, ln. 20.			
Transource St. No. 8-R		15	13-21	Beginning after "years"		
		17-18	Pg. 17, Ln. 23 – Pg. 18, Ln. 19	Beginning after "paths."		
		19	Ln. 12 – 18			
		1		Remove last portion of first bullet point starting with "and"  Fourth and fifth bullet point.		
Exhibit No. TH-5R	Timothy Horger	r 4		Everything under "Reliability Benefits"  Last full sentence stating "addresses emerging reliability issues"		

# **Exhibit A**

Testimony	Witness	Page(s)	Line Number(s)	Note
Exhibit No. TH-5R	Timothy Horger (cont.)	5-6		Everything after "III. Reliability Benefits"
(cont.)		11		Fourth and fifth last sentence, starting with "Today" and ending with "2023."
		3	1-11	
		4-10		
Transource St. No. 10-R	Judy Chang	11-12	Pg. 11, Ln. 14 – Pg. 12, Ln. 17	



## **BEFORE THE** PENNSYLVANIA PUBLIC UTILITY COMMISSION

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finding that a building to shelter control equipment at the Rice Substation in Franklin County, Pennsylvania is reasonably necessary

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Application of Transource Pennsylvania, LLC for approval to acquire a certain portion of the lands of various landowners in York and Franklin Counties, Pennsylvania for the siting and construction of the 230 kV Transmission Lines associated with the Independence Energy Connection – East and West Projects as necessary or proper for the service.

accommodation, convenience or safety of the

public

Docket No. A-2017-2640195

Docket No. A-2017-2640200

Docket No. P-2018-3001878

Docket No. P-2018-3001883

Docket No. A-2018-3001881, et al.

#### TRANSOURCE PENNSYLVANIA, LLC

#### REBUTTAL TESTIMONY OF

**BRIAN D. WEBER** 

STATEMENT NO. 1-R

Date: November 27, 2018

1	Q.	Please state your name and business address.
2	A.	My name is Brian D. Weber, and my primary office is located at 1 Riverside Plaza in
3		Columbus, Ohio.
4		
5	Q.	Have you previously provided Direct Testimony in this proceeding?
6	A.	No, however I am adopting the direct testimony of witness Peggy Simmons.
7		
8	Q.	Please describe the purpose of your Rebuttal Testimony.
9	A.	In my testimony, I will first organize and summarize the various positions and opposition
10		to Transource Pennsylvania, LLC's ("Transource PA" or the "Company") Application
11		made by parties in their direct testimonies. I will then summarize Transource PA's
12		response to each objection and introduce the witnesses that will provide the detailed
13		rebuttal testimony regarding these issues. I will also provide more detailed testimony on
14		several topics that will not be covered by other witnesses.
15		
16	Q.	Are you sponsoring any exhibits with your Rebuttal Testimony?
17	A.	Yes. I am sponsoring the following exhibits:
18		TPA Exhibit Nos. BDW-1R through BDW-9R.
19		
20		SUMMARY OF REBUTTAL CASE
21	Q.	Mr. Weber, please provide a summary of the objections to Transource PA's
22		Application made by interveners in their direct testimonies.
23	A.	The objections to Transource PA's Application can be split into two broad categories:

1		<ul> <li>First, parties have raised issues with the need for and selection of the Project; I</li> </ul>
2		will refer to these topics as Need Issues in my testimony.
3		• Second, parties have also identified specific issues with the siting of the
4		Project; I will refer to these topics as Siting Issues in my testimony.
5		
6		SUMMARY OF NEED ISSUES
7	Q.	Please summarize the Need Issues raised by interveners and reference the
8		arguments made by intervener witnesses relevant to each of the Need Issues.
9	A.	Certain parties have questioned both the value of the Project and PJM Interconnection
10		LLC's ("PJM") underlying planning process for determining and approving Market
11		Efficiency projects. I have generally identified six specific Need Issues raised, along
12		with the party which makes each claim:
13		1) The following witnesses make various claims that PJM's underlying Market
14		Efficiency planning process is flawed.
15		o Office of Consumer Advocate ("OCA") witness Rubin claims that the
16		PJM benefits metric is not sound. (See OCA St. No. 1, p. 24)
17		o Witness Shaw claims that the ProMod market simulation software
18		analysis is ineffective. (See Shaw St. No. 1, pp. 16-17)
19		2) The following witnesses make various claims that the Project has no
20		reliability benefits, or make other statements pertaining to reliability matters.
21		o Both OCA witnesses Rubin and Lanzalotta claim the project has no
22		reliability benefits. (See OCA St. No. 1, p. 44; OCA St. No. 2, pp. 11-
23		12)

1	o Witness Shaw also claims that non-transmission solutions closer to the
2	load are better for reliability. (See Shaw St. No. 1, p. 15)
3	3) The following witnesses make various claims that PJM's Market Efficiency
4	planning process does not align with PA's rules and interests.
5	o OCA witness Rubin claims the PJM process does not consider
6	Pennsylvania PEDF/PUC regulations and siting rules. (See OCA St.
7	No. 1, pp. 16-18)
8	o OCA witness Lanzalotta claims the PJM process does not consider
9	environmental and land use impacts. (See OCA St. No. 2, p. 21)
10	4) The following witnesses make various claims that the value of the Project has
11	deteriorated since its approval by PJM through decreased benefit to cost
12	metrics that continue to trend downward.
13	o OCA witness Lanzalotta claims that the addressed congestion, and
14	resultant economic value of the Project, has dropped. (See OCA St.
15	No. 2, pp. 17-20)
16	o OCA witness Lanzalotta also claims that the cost estimate for the
17	Project has not been updated. (See OCA St. No. 2, p. 14)
18	5) The following witnesses make various claims that a different project that
19	makes greater use of existing transmission corridors should be utilized or that
20	PJM did not fully consider alternatives to the Project.
21	o OCA witness Rubin claims PJM did not evaluate adequate alternatives
22	in its planning process. (See OCA St. No. 2, pp. 43-33)

1		o OCA witness Lanzalotta claims the East Leg of the Project (e.g.
2		Furnace Run to Conastone) should be replaced by additions within
3		existing corridors of two transmission lines owned by PPL; this claim
4		was also voiced in public hearings. (See OCA St. No. 2, pp. 20-21)
5		o OCA witness Lanzalotta also claims the West Leg of the Project (Rice
6		to Ringgold) should be replaced by the Mid-Atlantic Interstate
7		Transmission proposal referred to as Project 18H in the PJM selection
8		process. (See OCA St. No. 2, pp. 21-22)
9		6) The following witnesses make various claims that this congestion issue can be
10		addressed with non-transmission investment and program alternatives.
11		o OCA witness Crandall and witness Shaw both claim that non-
12		transmission alternatives can more effectively address the AP South
13		congestion. (See OCA St. No. 3, pp. 3-6; 12-28)
14		o OCA witness Crandall also points to various speculative programs that
15		he claims will sum to a "small utility" worth of capacity and energy in
16		the future that PJM does not take into account in its planning process.
17		(See OCA St. No. 3, p. 28)
18		
19	Q.	How will Transource PA respond to Need Issue #1: the claim that PJM's underlying
20		Market Efficiency planning process is flawed?
21	A.	Transource PA will clearly demonstrate that PJM's Market Efficiency planning process is
22		highly sound and the selected Project 9A will provide substantial benefit to both the
23		broad PJM region and Pennsylvania specifically.

1		Witness Herling, PJM's Vice President - Planning, will demonstrate that investing
2		in transmission solutions to remove congestion on the transmission system is a
3		vital part of preserving and facilitating efficient regional markets that, taken as a
4		whole, generate tremendous value to participants, including the state of PA. Mr.
5		Herling will provide additional support to validate the methodology used by PJM
6		to calculate benefits of a Market Efficiency Project, refuting the claim by Mr.
7		Rubin.
8		• Witness Cawley will explain why the benefits calculation used by PJM is
9		reasonable and appropriate to ensuring non-discriminatory open access to the PJM
10		transmission system.
11		• Witness Chang, Principal of the Brattle Group, will demonstrate that there are
12		multiple additional benefits of the Project that are not considered in the PJM
13		benefits metric that add to the value of the Project.
14		
<del>15</del>	<del>Q.</del>	How will Transource PA respond to Need Issue #2: the claim that the Project has no
<del>16</del>		reliability benefits?
<del>17</del>	<del>A.</del>	Transource PA will clearly demonstrate that the Project does address both specific PJM
<del>18</del>		reliability criteria violations and provide broader regional system resiliency.
<del>19</del>		Witness Herling will demonstrate that if the Project were not constructed this
<del>20</del>		would cause multiple reliability issues on the PJM system.
<del>21</del>		• Witness Ali, Director Transmission Planning, will describe how the Project
<del>22</del>		provides broader regional system resilience.

1	Q.	How will Transource PA respond to Need Issue #3: the claim that PJM's Market
2		Efficiency planning process does not align with Pennsylvania's rules and interests?

- Transource PA will clearly demonstrate that PJM planning processes are very well aligned with the interests of Pennsylvania. Pennsylvania broadly benefits from its participation in the efficient PJM regional markets, which are made possible by all market participants following PJM's policies and market rules including planning processes which ensure the market can operate efficiently.
  - Witness Herling will highlight the tremendous benefits to Pennsylvania generated by the efficient PJM markets that would not be realized if market participants selectively picked which PJM market rules they choose to follow.
  - Witness Cawley explains the importance of regional planning for Pennsylvania and the Commission's policy of supporting regional planning.
  - I will also directly discuss why this project-specific siting proceeding is not the appropriate venue to decide regional policy issues which pertain to items jurisdictional to the FERC including transmission cost allocation and planning processes.

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A.

- Q. How will Transource PA respond to Need Issue #4: the claim that the value of the Project has deteriorated since its approval by PJM and is trending downward?
- A. Transource PA will clearly demonstrate that the value of the Project remains very strong and that it continues to be a highly cost effective solution to this chronic market inefficiency.

1		• Witnesses Herling and Ali both will demonstrate that the AP South congestion
2		remains a significant issue.
3		• Witness Horger will describe how the Project has been validated in multiple PJM
4		restudies, the most recent of which was presented in September.
5		• I will describe the timing and impact of the recent update to the Project cost
6		estimate provided by Transource for its portions of Project 9A that totaled a \$3
7		million increase, with supporting information provided by Witness Stein.
8		
9	Q.	How will Transource PA respond to Need Issue #5: the claim that PJM should have
10		selected a project that makes greater use of existing transmission corridors?
11	A.	Transource PA will clearly demonstrate that existing transmission corridors have been
12		studied and are not viable alternatives to this project.
13		• I will discuss PJM's FERC Order No. 1000 competitive process sponsorship
14		model, which was expressly designed to encourage submission and robust
15		analysis of multiple alternatives to find the most cost-effective solution to
16		regional system planning needs.
17		• Witness Horger will discuss the specific analysis of the 9A proposal and how
18		it considered alternatives to the West Leg of the Project in PJM's planning
19		process and determined those to be inferior to Project 9A.
20		• Wintess Herling will present the results of PJM's recent study of an
21		alternative to the East Leg of the Project using existing transmission corridors
22		and his conclusion that this option is deficient.

Q.	How will Transource PA respond to Need Issue #6: the claim that this congestion
	issue should be addressed with non-transmission investments and programs?

- Transource PA will clearly demonstrate that congestion on the AP South interface is not a local problem that impacts only Maryland and Virginia; rather, it is a chronic market inefficiency that impacts the PJM region including Pennsylvania. Transource PA will demonstrate that other options to reduce this congestion are already appropriately considered.
  - Witnesses Herling and Ali will describe how this market inefficiency broadly impacts regional system planning and why a robust transmission solution is appropriate.
  - Witness Herling will also describe how non-transmission investments and programs are already appropriately considered in PJM's planning process, both in terms of creating opportunity and incentive to locate new generation resources and in terms of capturing expected impacts in load forecasts. In contrast, Mr. Crandall's allegations that the need for the Project can be eliminated by non-transmission alternatives are both unsupported and inaccurate.
  - I will discuss that OCA's forecasts of increased non-transmission alternatives
    to reduce congestion are too speculative to be considered; and even if they
    were to occur no evidence has been provided to demonstrate that they either
    impact the need of the Project or address the energy needs of future load
    forecasts.

A.

## SUMMARY OF SITING ISSUES

1		SUMMART OF SITING ISSUES
2	Q.	Please summarize the Siting Issues raised by interveners.
3	A.	The Siting Issues pertain to specific concerns and issues voiced by interveners and in
4		public hearings about the siting work done by Transource PA and about potential impacts
5		the line may have on the local area. I have identified seven general Siting Issues:
6		1) There are concerns voiced by intervener witnesses Rubin, Lanzalotta and
7		Shaw and in the public hearings about the Siting Study and Proposed Route.
8		(See OCA St. No. 1, pp. 17-17; OCA St. No. 2, pp. 20-22; Shaw St. No. 1, pp.
9		7-11; see, e.g., Tr. at pp. 230, 288, 750, 756, 1101, 1088, 1090, 1107, 1124)
10		2) There are concerns voiced by intervener witnesses Gobrecht, Shaw and Dague
11		and in public hearings about various potential environmental impacts. (See
12		YCPC St. No. 1, pp. 18-31; Shaw St. No. 1, p. 11; STFC St. No. 1, pp. 3-5;
13		see, e.g., Tr. at pp. 430, 550, 1388-89, 1524, 1959, 1988)
14		3) There are concerns voiced by intervener witnesses Gobrecht and Shaw and in
15		public hearings about potential impacts on farming operations and agri-
16		tourism. (See YCPC St. No. 1, pp. 7-17; Shaw St. No. 1, pp. 7-11; see, e.g.,
17		Tr. at pp. 104, 328, 1165, 1179)
18		4) Witnesses Rubin and Gobrecht make several allegations that Transource has
19		not followed various state and local zoning and regulatory requirements. (See
20		OCA St. No. 1, pp. 16-18; YCPC St. No. 1, pp. 36-38)
21		5) Several witnesses in the public hearings expressed concern about the impact
22		of the Project on property values. (See, e.g., Tr. at pp. 227, 369, 430, 1906,

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1918)

1		6) Several witnesses in the public hearings expressed concern about EMF, stray
2		or induced voltage and compatibility with communications equipment. (See
3		e.g., Tr. at pp. 128, 137-138, 356, 462, 581, 609-610, 799, 876, 880, 914-15
4		921-22)
5		7) Several witnesses in the public hearings expressed concerns about interactions
6		with representatives of Transource. (See, e.g., Tr. at pp. 136, 182, 628, 1133-
7		34)
8		
9	Q.	How will Transource respond to Siting Issue #1 that the siting analysis is flawed?
10	A.	Transource PA will demonstrate that its siting process considered approximately 150
11		different route segments for the East and West Legs, paralleled existing infrastructure to
12		the extent reasonably possible and presented a Proposed Route that minimizes impacts to
13		landowners.
14		• Witness Baker will demonstrate that the siting methodology used for the
15		Project complies with the Commission's rules and regulations.
16		• Witness Baker will testify that Transource PA evaluated multiple
17		opportunities to parallel existing infrastructure and evaluated many different
18		route segments such that presenting another alternative would have not value.
19		• Witness Baker will also testify that Transource PA's siting process did no
20		target any particular segment of the population or religious group but
21		attempted to site the lines to comply with the Commission's regulations

1	Q.	How will Transource respond to Siting Issue #2 that the siting will have adv	erse
2		environmental impacts?	

- A. Transource PA will demonstrate that its siting process appropriately minimizes and mitigates environmental impacts and is fully consistent with Commission regulations, Court decisions and statutes regarding environmental impacts.
  - Witness Baker will discuss the environmental surveys conducted by the
    Company and the coordination with agencies to address and mitigate
    environmental impacts. Witness Baker also discusses efforts to mitigate
    environmental impacts for specific features such as Falling Springs and
    Muddy Creek mentioned by parties.
  - Witness Baker will also explain that the Company meets the requirements of PEDF and appropriately considers the factors set forth in Act 45 related to preserved farmland.
  - experience constructing transmission lines in areas where there is karst topography; that existing transmission lines, including in Franklin County, have been built over karst topography and that the Company is conducting a karst inventory and will be able to safely build the transmission line.

- Q. How will Transource respond to Siting Issue #3 that the proposed transmission lines will have a negative impact on farming operations?
- A. Transource PA will demonstrate that the transmission lines will have a minimal impact on farming operations.

1		• Witness Herzog testifies that farming is compatible with the proposed
2		transmission lines and that the Company is mitigating the impacts on farming
3		by using monopole towers as opposed to lattice towers.
4		• Witness Baker will testify that the Company attempts to locate towers as close
5		to property lines as reasonably possible but cannot do this at all times due to
6		environmental issues, structures or causing too many directional changes.
7		• Witness Mercer will testify that EMF from the lines will not negatively affect
8		farm animals such as cows or horses.
9		• Witness Silva will testify that the proposed transmission lines will not impact
10		Global Positioning Systems.
11		
12	Q.	How will Transource respond to Siting Issue #4 that the siting is inconsistent with
	Q.	How will Transource respond to Siting Issue #4 that the siting is inconsistent with zoning and other local regulatory requirements?
12	<b>Q.</b> A.	
12 13		zoning and other local regulatory requirements?
12 13 14		zoning and other local regulatory requirements?  Transource PA will demonstrate that its siting is consistent with local zoning regulations
12 13 14 15		zoning and other local regulatory requirements?  Transource PA will demonstrate that its siting is consistent with local zoning regulations to the extent reasonably possible and that Transource PA will continue to work with local
12 13 14 15 16		zoning and other local regulatory requirements?  Transource PA will demonstrate that its siting is consistent with local zoning regulations to the extent reasonably possible and that Transource PA will continue to work with local governments regarding project construction issues.
12 13 14 15 16		<ul> <li>zoning and other local regulatory requirements?</li> <li>Transource PA will demonstrate that its siting is consistent with local zoning regulations to the extent reasonably possible and that Transource PA will continue to work with local governments regarding project construction issues.</li> <li>Witness Baker explains that the location of the substation building in York</li> </ul>
12 13 14 15 16 17		<ul> <li>zoning and other local regulatory requirements?</li> <li>Transource PA will demonstrate that its siting is consistent with local zoning regulations to the extent reasonably possible and that Transource PA will continue to work with local governments regarding project construction issues.</li> <li>Witness Baker explains that the location of the substation building in York County is consistent with local zoning regulations to the extent reasonably</li> </ul>

<del>22</del>

1	Q.	How will Transource respond to Siting Issue #5 that the proposed lines will
2		significantly decrease property values?
3	A.	Transource PA will demonstrate that the proposed transmission lines will not have a
4		material impact on property values.
5		Witness Dominy presents national and Pennsylvania studies demonstrating
6		that transmission lines do not materially impact property values.
7		• Witness Rothman explains his analysis that transmission lines located in
8		Franklin and York counties do not materially impact property values.
9		
10	Q.	How will Transource respond to Siting Issue #6 that the proposed transmission lines
11		will cause EMF concerns and stray voltage?
12	A.	Transource PA will demonstrate that the proposed transmission lines will be safe and will
13		not present concerns as to EMF or stray voltage.
14		Witness Silva calculates the EMF levels from the proposed transmission lines
15		and explains how they relate to common everyday EMF levels. Witness Silva
16		also explains that the proposed transmission lines will not present stray
17		voltage concerns.
18		• Witness Lee explains that the EMF levels from the lines will not increase
19		cancer or other health risks.
20		Witness Mercer explains that dairy cow production will not be negatively
21		impacted by the proposed transmission lines.

1	Q.	How will Transource respond to Siting Issue #7 that Transource PA representatives
2		have not been honest in dealing with landowners?
3	A.	Transource PA will explain its approach to working with landowners.
4		• Witness Schaffer explains the Company's policy with respect to dealing with
5		landowners on power line projects and address some concerns raised in public
6		hearings.
7		
8	Q.	Does this conclude your organization and summarization of the various objections
9		to Transource PA's application and can you briefly restate this effort?
10	A.	Yes. This is a multifaceted case with many topics discussed by both the Company and
11		the interveners. In an effort to organize the content of this case, I first grouped the topics
12		as Need Issues or Siting Issues; next, I further defined the topics within each grouping,
13		summarized the Company's response to each topic, and identified the witness that will
14		provide detailed testimony regarding that topic. These responses will clearly demonstrate
15		that the need for Project 9A continues to be supported, and the Company has met or
16		surpassed Pennsylvania's siting requirements and, therefore, this Application should be
17		approved.
18		

- Q. You stated that you will provide more detailed testimony on several topics that will
   not be covered by other witnesses, please state these topics.
- 21 A. I will provide more detailed testimony on the following topics:
- The timing and impact of cost updates provided by Transource to PJM for the
  Project.

PJM's competitive planning process uses market forces to broadly consider 1 2 many alternatives to find the most cost effective solution to regional system planning needs. 3 4 Alternatives suggested to the East Leg of the Project are not viable. 5 OCA Witness Crandall's forecasts of non-transmission alternatives are 6 completely speculative; and even if they were to occur no evidence has been 7 provided to demonstrate that they either impact the need of the Project or 8 address the energy needs of future load forecasts. 9 This project-specific siting proceeding is not the appropriate venue to decide 10 regional policy issues. 11 The Company's position on funding a Land Impact Mitigation Fund. 12 13 DISCUSSION OF IEC PROJECT COST UPDATES 14 Q. OCA witness Lanzalotta and several witnesses at the public input hearings claim 15 that the cost estimate for the Project has not been updated, is this accurate? (See 16 OCA St. No. 2, p. 14) 17 A. No. Transource has constantly monitored the expected cost of the Project and provided 18 PJM with quarterly updates to the cost estimate pursuant to PJM protocols. Prior to 19 October 2018, these updates provided to PJM confirmed that the existing cost estimate of 20 \$197 million (in 2015 dollars) remained valid. Subsequently, in October 2018,

Transource provided to PJM an updated cost estimate for the Project of \$200 million (in

2015 dollars), an approximately \$3 million increase. After applying appropriate

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1		escalation to account for annual inflation, this updated cost estimate was reflected in the
2		PJM RTEP project database as \$217 million in October 2018 dollars.
3		
4	Q.	So, prior to October 2018, Transource had provided PJM with updates to the cost
5		estimate for the Project?
6	A.	Yes. These updates confirmed that the existing cost estimate remained unchanged.
7		
8	Q.	Did any project component costs vary over time from the original estimate before
9		October 2018?
10	A.	Yes.
11		
12	Q.	If that was the case, why wasn't the estimated project cost not changed unti
13		October 2018?
14	A.	As part of its cost estimate submission to PJM, Transource included in its project costs
15		two provisions to cover future project cost variability.
16		The first provision is a known adjustment to the 2015 cost submission to cover
17		future general inflationary estimates to ensure that cost changes that happen through
18		industry-wide factor causes are planned for. It is my understanding that PJM uses are
19		annual inflation adjuster of 2.3%. This adjuster ensures that future inflationary increases
20		in project costs are considered as part of the benefit to cost analysis that PIM undertakes

for market efficiency projects.

The second provision is a reservation for project contingency to cover project unknowns in the case that they arrive. The project estimate included a reservation for contingency at that time.

Based upon multiple discussions with the project management team led by Company Witness Stein, costs on certain components within the Project had both increased and decreased. These increases and decreases largely offset each other. Any costs variances known before October 2018 were within the provisions for cost variance discussed above so there was no reason to change the overall project cost estimate until October 2018.

Q.

A.

## What happened in October 2018 that led to a change in project cost estimate?

Along with the most recent cost update provided to PJM in September 2018 to support a re-evaluation of the Project benefit to cost ratio, Transource PA advised PJM that the line construction contract work for the Project was out for competitive bid, and therefore a cost update was expected in October 2018 when these bids were received. Transource committed to provide an update to the Project costs incorporating the line construction bid results as part of its quarterly progress report to PJM.

# Q. What were the major drivers of the \$3 million increase to the cost estimate of the Project as of October 2018?

A. Factors contributing to the October 2018 change to the cost estimate of the Project include:

1		• Changing the structure type from lattice towers to steel monopoles; this has
2		been the only substantial scope change to the Project.
3		• Monitoring recent pricing both monopoles and conductor reflecting steel and
4		aluminum prices.
5		• Bids received from contractors for the construction of the transmission line
6		work which is the largest single contract component for the Project.
7		• Updated pricing from suppliers for the thirteen 500/230 kV transformers
8		which is largest material cost component for the substations.
9		• Updated projections for right-of-way ("ROW"), siting/permitting and project
10		management costs based on actual costs incurred up to that point as well as
11		future projections.
12		As discussed previously, some factors caused the expected Project cost to go up and
13		others caused the expected Project cost to go down. Company Witness Stein provides a
14		breakdown of the costs submitted in October 2018 in his rebuttal testimony.
15		
16	Q.	You mention substantial scope change in structure type from lattice towers to steel
17		monopoles. Why is this important?
18	A.	As further outlined in the testimony of Company Witness Herzog, Transource received
19		multiple comments and concerns with the use of lattice towers and supporting the use of
20		steel monopole structures. Steel monopoles result in less ROW and smaller footprints on
21		the ROW and are more compatible with land uses such as agriculture as further discussed
22		by Witness Herzog.

1	Steel monopoles use more steel and concrete than the originally planned lattice
2	structures; this makes the use of steel monopoles somewhat more expensive. As a result,
3	the project design team estimated that this scope change would cause an approximately
4	\$7.3 million increase to the transmission line portions of the cost estimate.
5	Transource was able to offset a portion of these costs from savings through the

Transource was able to offset a portion of these costs from savings through the procurement activities associated with other major items, such as major substation equipment, but was not able to fully offset the cost of implementation of monopoles within its original cost estimate which was for a lattice tower scope.

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- So the use of steel monopoles resulted in a cost increase of approximately \$7.3 million but the overall costs were only increased by \$3 million. Does this mean that without the scope change to steel monopoles the costs would still be within the original costs?
- 14 A. Yes.

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- Q. Have the cost estimates changed for other (non-Project) components of PJM Project9A?
- A. Yes. My understanding is that PJM receives cost estimate updates for the other (non-Project) components of PJM Project 9A from the utilities which are constructing those components. Witness Horger provides more information on those cost estimate updates.

- 1 Q. While you can't speak directly for the cost of project being constructed by others,
- 2 do you have any thoughts on why the costs for other (non-Project) components of
- 3 PJM Project 9A may have changed more than the Project?
- 4 A. Yes. When Transource proposed Project 9A to PJM, it was able to analyze in detail the 5 components of the project scope it would be responsible for (the Project components) and 6 provide a thorough initial cost estimate. For the non-Project components, such as work 7 needed to interconnect to the existing Ringgold and Conastone substations, Transource 8 had less information about the required scope of work and, therefore, provided to PJM 9 initial cost estimates based upon limited information. Once Project 9A was approved by 10 PJM, the designated entities for the non-Project components have since completed a detailed analysis of the work scope associated with and provided PJM with updated cost

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## <u>DISCUSSION OF PJM'S COMPETITIVE PLANNING PROCESS</u>

- 15 You stated earlier under Need Issue #5 that OCA witness Rubin and Lanzalotta Q.
- both claim that PJM and Transource PA did not consider various alternatives to the 16
- Project. (OCA St. No. 1, pp. 16-17; OCA St. No. 2, pp. 20-22) Do you agree with 17
- Mr. Rubin and Mr. Lanzalotta on this point? 18
- 19 No, I do not agree. As explained in the direct and rebuttal testimony of witnesses Baker A.
- 20 and Herling, PJM and Transource PA evaluated multiple alternatives. In addition to
- 21 these analyses, it should be noted that the PJM competitive planning process uses market
- 22 forces to generate and incentivize market participants to submit a very robust response
- 23 and compete for the best project.

estimates.

Q.	How does the PJM competitive planning process use market forces to generate a
	robust response of ideas for the best project?

The PJM competitive planning process starts with engagement from a broad set of market participants, including incumbent and non-incumbent transmission owners and other competitive developers to submit creative solutions in response to a PJM problem statement. In the PJM 2014/15 Long Term Proposal Window, a total of 19 entities submitted proposals for market efficient projects.

Next, the PJM competitive planning process creates a clear incentive for these participants to evaluate every realistic option in an effort to identify the best project as the proposer or "sponsor" of that idea will be awarded the project to construct and own. However, while market participants look at many different solutions, they likely do not just propose to PJM every idea they come up with as there is a proposal submission fee and a substantial amount of work necessary to meet PJM's proposal requirements. As a result, Transource PA, and likely other participants, analyze and filter their ideas by weeding out the poorly performing ideas and proposing to PJM their most promising solutions.

In the PJM 2014/15 Long Term Proposal Window in which PJM Project 9A was selected, PJM received 41 proposals for solutions to the PJM problem statement to relieve congestion on the AP South interface. These 41 solutions were evaluated by PJM over an 18-month process, resulting in the selection of Project 9A; the Company has made this point in direct testimony. What I want to emphasize here is that there were likely many more solutions evaluated by the 19 developers who submitted proposals to PJM, with the poorly performing ideas eliminated by the developers.

A.

- Q. So, you are saying that the search for the best solution to address congestion on the
  AP South interface was actually likely much broader than just the 41 proposals
- 4 received by PJM?
- 5 A. Yes.

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### DISCUSSION OF ALTERNATIVES TO THE EAST LEG OF THE PROJECT

- 8 Q. OCA witness Lanzalotta, as well as multiple witnesses in the public hearings,
- 9 recommends that the East Leg of the Project should be either be replaced with
- line(s) in existing transmission corridors owned by PPL or that the East Leg of the
- Project should be replaced with additional circuits on lines already owned by PPL.
- 12 (OCA St. No. 2, pp. 20-21) How will you address this?
- 13 A. For clarity and completeness, I will separately define these options and address why
- neither is viable. The first suggested option is to move the route of the East Leg into the
- existing corridors owned by PPL; I will refer to this as "East Leg Paralleling Option."
- The second suggested option is to replace the East Leg with additional circuits hung on
- the existing towers of lines owned by PPL; I will refer to this as "East Leg Replacement
- 18 Option."

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- 20 Q. How will the Company address the East Leg Paralleling Option?
- 21 A. As further described in the testimony of Witness Baker, the use of existing corridors
- would need additional ROW as the facilities cannot be placed into the existing corridors.

### Q. How will the Company address the East Leg Replacement Option?

A. PJM has studied the East Leg Replacement Option and demonstrated that it is not an acceptable technical solution; this analysis is discussed in the rebuttal testimony of Witness Herling.

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- Q. Please provide additional background on the PJM analysis of the East Leg
   Replacement Option referenced above.
- A. OCA Witness Lanzalotta presents a recommendation to add a new 230-kV circuit to each of the existing PPL tower lines as a replacement to the East Leg of the Project. (OCA St. No. 2, pp. 20-21) Mr. Lanzalotta does not provide any additional technical detail or analysis of this alternative. *See* TPA Exhibit No. BDW-1R, which is OCA's response to TPA-OCA, Set II, Question 9.

Subsequent to the submittal of Mr. Lanzalotta's direct testimony, a party in the Maryland regulatory proceedings for the Project, Power Plant Research Program or "PPRP", submitted a data request describing a more detailed and technically supported version of the option described by Mr. Lanzalotta; PPRP referred to this options as the "Conceptual Alternative." The PPRP data request asked if the Company and/or PJM had performed any analysis of the Conceptual Alternative and, if not, requested that analysis be performed. The Conceptual Alternative was defined by PPRP as:

Conceptual Alternative to Transource's proposed new Furnace Run-Conastone double-

21 circuit 230 kV line with a new Furnace Run-Conastone 230 kV line and a new Furnace

22 Run-Graceton 230 kV line.

1	• Transource's proposed Furnace Run Substation and its tap into the Peach
2	Bottom-Three Mile Island 500 kV line would not change with the Conceptual
3	Alternative.
4	• The new Furnace Run-Conastone 230 kV line would parallel PPL's de-
5	energized Yorkana-Face Rock 69 kV line to the interconnection point with the
6	existing PPL Otter Creek-Conastone 230 kV line then would be installed on
7	the existing structures of this line from this point to Conastone.
8	• The new Furnace Run-Graceton 230 kV line would parallel PPL's de-
9	energized Yorkana-Face Rock 69 kV line to the interconnection point with the
10	existing PPL Manor-Graceton 230 kV line then would be installed on the
11	existing structures of this line from this point to Graceton.
12	• Incremental terminal equipment in the Conastone Substation would decrease
13	with the Conceptual Alternative's single incremental 230 kV line terminating
14	in that substation.
15	• Incremental terminal equipment would have to be added in the Graceton
16	Substation to accommodate the new incremental 230 kV line into that
17	substation with the Conceptual Alternative.
18	BGE's rebuild of the Conastone-Northwest double circuit 230 kV line would
19	be modeled as part of the Conceptual Alternative just as it was with the IEC
20	project.

- To the extent practicable, the conductors to be modeled for the Conceptual

  Alternative would be the same as those used by PPL when it rebuilt the

  Conastone-Otter Creek and Graceton-Manor 230 kV lines—1590 KCMIL

  45/7 ACSR "Lapwing" conductor with a summer normal rating of 1626 Amps

  (647 MVA @ 230 kV) and summer emergency rate of 2013 Amps (801 MVA)

  @ 230 kV). That same conductor should be modeled for the rebuilt portion of

  BGE's Graceton-Manor 230 kV line noted above.
  - The conductors to be installed on BGE's portion of the new Furnace Run-Conastone 230 kV line and a rebuild, if any, of its portion of the Conastone-Otter Creek 230 kV line, would be determined by BGE given the capability of the existing double-circuit structures and consistent with good utility practices.

See TPA Exhibit BDW-2R, which is a copy of the response to PPRP's data request in the Maryland regulatory proceeding. As described by Witness Ali, the Conceptual Alternative represents a practical and more sophisticated implementation of Mr. Lanzalotta's general concept.

### Q. Has PJM performed an analysis of the Conceptual Alternative?

A. Yes. As I stated above, PJM has studied the Conceptual Alternative and demonstrated that it is not an acceptable technical solution; this analysis is discussed in the rebuttal testimony of Witness Herling.

1	Q.	In PJM's competitive planning process, what company would be assigned by PJM				
2		as the Designated Entity for work within existing electric utility rights-of-way, such				
3		as the suggested use of PPL's corridors in Conceptual Alternative?				
4	A.	Under the PJM Tariff, the incumbent transmission owner would be assigned by PJM as				
5		the Designated Entity for any work within their existing rights-of-way; in this case PPL.				
6						
7	Q.	So, PPL had a strong incentive to propose a solution either adding circuits to				
8		structures or placing facilities in their existing structures if such a solution were				
9		promising. Is this right?				
10	A.	Yes and PPL did not propose such an alternative, despite submitting four other proposals				
11		into the PJM 2014/15 Long Term Proposal Window. Since then, PPL has not provided				
12		any evidence that either of these solutions are workable. Even with this uncertainty, PJM				
13		has studied the only solution that PPL indicates has a potential to be workable, although				
14		additional facilities would still be needed to fully address technical constraints with this				
15		solution.				
16						
17	Q.	Has any entity presented evidence that either the East Leg Paralleling Option or the				
18		East Leg Replacement Option is an acceptable replacement to the East leg of the				
19		Project?				
20	A.	No. In fact, PPL has confirmed in data requests that they have completed no such				
21		analysis. See TPA Exhibit No. BDW-3R, which are PPL's responses to TPA-PPL Set I,				

Questions 4 and 8 and PPL's supplemental responses to TPA-PPL Set I, Questions 10

1		and 11. Comments and testimony by other parties about the viability of these alternatives
2		is simply conjecture.
3		
4		NON-TRANSMISSION ALTERNATIVES
5	Q.	OCA witness Crandall argues that non-transmission alternatives such as energy
6		efficiency, demand response, renewable energy and distributed resources reduce the
7		need for the IEC Project. (OCA St. No. 3, p. 30.) Witness Crandall then forecasts
8		the level of energy reductions from these resources in his testimony, which he claims
9		will reduce congestion. Can Witness Crandall's forecasts be relied upon?
10	A.	No. I am not aware of any requirement that the non-transmission alternatives forecasted
11		by Witness Crandall actually be constructed, or in the case of energy efficiency measures,
12		be implemented. Even Witness Crandall recognized this in his discovery responses.
13		Transource PA asked Witness Crandall to:
14 15 16 17 18		Please describe in detail all the regulatory or other approvals that have been obtained in connection with the 206 MW and 545 GWh/year energy efficiency resources and the 3,723 MW of renewable energy predicted by Mr. Crandall.
19		Witness Crandall responded:
20 21 22		To clarify the premise of the question, this is not Mr. Crandall's prediction of what will occur.
23		(See OCA response to TPA-OCA Set III, Question 7, which is provided as TPA Exhibit
24		No. BDW-4R)
25		Likewise, when asked how the District of Columbia City Council will meet its goal of
26		supplying 50% of its energy usage by solar photovoltaics by 2032. Witness Crandall
27		stated:

1	Whether they [the District of Columbia] actually achieve 50%, or more, or
2	less, is not the point.
3	
4	(See OCA response to TPA-OCA Set III, Question 8, which is provided as TPA

(See OCA response to TPA-OCA Set III, Question 8, which is provided as TPA Exhibit No. BDW-5R)

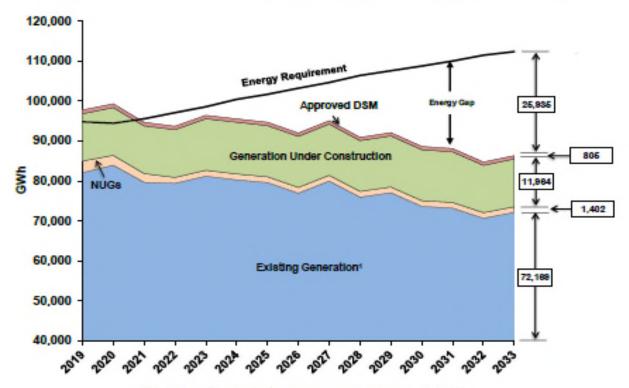
These statements made by Witness Crandall clearly demonstrate that his forecasts are speculative, not supported by evidence and cannot be relied upon. In addition, Witness Crandall provides no evidence that even if the speculative alternatives he lists were to occur it would reduce congestion on the AP South interface.

A.

# Q. Are there other reasons to believe Witness Crandall's argument that non-transmission alternative in Virginia, Maryland and D.C. will reduce congestion on AP South is flawed?

Yes. I reviewed the Dominion Energy Integrated Resource Plan ("Dominion IRP") that Witness Crandall relied upon as support for his claims that the Virginia Grid Transformation and Security Act of 2018 (the "GTSA") would reduce customers' overall annual energy usage by 805 GWh and peak demand by 304 MW by 2033. (*See* TPA Exhibit No. BDW-6R, which is OCA's response to TPA-OCA Set III, Question 5) Witness Crandall emphasizes the 805 GWhs of future demand side management identified in this plan in his testimony. However, he fails to also mention that Dominion projects an energy shortfall of 25,935 GWh in 2033 even including the 805 GWh of annual energy savings from the GTSA. See the Chart below which was included on page 6 of the Dominion IRP.

Figure 6.2.3 - Current Company Energy Position (2019 – 2033)



Note: The values in the boxes represent total energy in 2033.

) Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.

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Likewise, Witness Crandall also did not mention that Dominion projects a capacity shortfall of 5,501 MW in 2033 even including the 304 MW of capacity from the GTSA. See the chart below which was included on page 5 of the Dominion IRP.

26,000 24,000 22,000 5,501 20,000 Approved DSM 304 ₹ 18,000 Generation Under Construction 1,585 16,000 Existing Generation<sup>1</sup> 16,490 14,000 12,000 10,000

Figure 1.3.1 - Current Company Capacity Position (2019 - 2033)

Note: The values in the boxes represent total capacity in 2033.

Accounts for potential unit retirements and rating changes to existing units in the Plan, and reflects summer ratings.
 See Section 4.2.2.

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### Q. In the tables from the Dominion IRP above, do you have any other general observations which you would like to point out?

A. Yes, four items stand out from a summary review.

First, the energy gap identified by Dominion of 25,935 GWh in 2033 is over 32 times as much as the 805 GWh of demand side management that Witness Crandall bases his testimony upon, yet he fails to mention this as a significant item.

Second, the generation forecast of Dominion in the future already anticipates the need to add 1,585 MW of new capacity, providing 11,964 GWh of energy.

Third, even with significant levels of planned future additions generation, there remains a significant energy gap.

1		Fourth, even with the addition of new generation and future demand side
2		management, the total energy requirement is significantly higher than today, while the
3		total energy in the forecast is lower than today.
4		
5	Q.	Why are these facts, which Witness Crandall omitted in this testimony, important?
6	A.	While no studies were provided by Witness Crandall to support his position, Witness
7		Crandall appears to base a large portion of his testimony upon the high level premise that:
8 9 10 11 12 13 14 15		"If the load on the higher cost side of the transmission constraint is too great for the transmission system to carry from the lower cost side, and if that then causes the higher cost generation in the higher cost area to be dispatched to alleviate the load on the transmission system, then reducing load in the higher cost area will also reduce the load on the transmission system. Dispatching generation and reducing load in the higher cost area both reduce the power flow across the congested transmission lines."
16		(See OCA response to TPA-OCA Set III, Question 19, which is provided as TPA Exhibit
17		No. BDW-7R)
18		Based upon Witness Crandall's logic outlined above, it would seem appropriate to note
19		that the total load in the future is higher even with the 805 GWh demand side
20		management assumption Witness Crandall mentions in the same areas and the energy
21		shortfall of 25,935 GWh is projected in the same timeframe.
22		
23		DISCUSSION OF REGIONAL POLICY ISSUES
24	Q.	Intervenor witnesses point to a number of alleged issues with the PJM Market
25		Efficiency Planning Process as part of their recommendations that the Commission
26		deny the Transource PA Application. How do you respond?

This project-specific siting proceeding is not the appropriate venue to decide regional policy issues such as how market efficiency projects are selected or how costs are allocated. Transmission ratemaking, including allocation of costs associated with a regional transmission system, are the jurisdiction of the Federal Energy Regulatory Commission ("FERC"). For example, as described in more detail by Witness Herling, the benefit metric used by PJM in the Market Efficiency analysis was resoundingly supported in an open stakeholder process at PJM and approved without protest at the FERC in Docket No. ER14-1394-000. The PJM stakeholder process and before the FERC are the appropriate venues to debate and determine key regional policies because it allows broad participation by impacted parties. Raising these concerns on ratemaking process and cost allocation in a siting forum is both out of time and in the incorrect venue.

A.

### **ENVIRONMENTAL ISSUES**

- 15 Q. YCPC Witness Gobrecht argues that Transource Pennsylvania should set aside 16 funds in a Land Impact Mitigation Fund to offset environmental impacts. (YCPC 17 St. No. 1, p. 23.) Is Transource PA willing to do this?
- 18 A. Transource PA is willing to consider this proposal, however, there are many unanswered
  19 questions that must first be addressed. When asked in discovery, YCPC did not propose
  20 any specific amount to be set aside. (*See* TPA Exhibit No. BDW-8R, which is YCPC's
  21 response to TPA-YCPC Set I, Question 7) It is also unclear from YCPC's testimony how
  22 the funds would be used, how they would be distributed and who would be entitled to

- them. (See TPA Exhibit No. BDW-9R, which is YCPC's response to TPA-YCPC Set I,
  Question 3)

  Q. Does this conclude your Rebuttal testimony?

  A. Yes.
- 6

Responses of the Office of Consumer Advocate to Transource's Interrogatories and Requests for Production of Documents SET II

### Transource to OCA-II-9

9. Re OCA Statement No. 2, page 20. Provide all analysis, study results, work papers or other correspondence relied upon or considered which would indicate that the reconfiguration of the PPL lines would provide an equivalent benefit of the IEC Project.

### Answer:

Mr. Lanzalotta's referenced testimony does not address reconfiguring PPL lines. It addresses using available 230 kV line positions on existing PPL transmission lines partially in lieu of transmission facilities proposed for the IEC. Mr. Lanzalotta does not address the benefits of this approach relative to the benefits projected for the IEC.

Prepared by: Peter Lanzalotta

### Response of the Applicant

Maryland Public Service Commission - Case No. 9471

In the Matter of the Application of Transource Maryland, LLC for a Certificate of Public Convenience and Necessity to Construct Two New 230 KV Transmission Lines Associated with the Independence Energy Connection Project in Portions of Harford and Washington Counties, Maryland

Discovery request submitted by: Power Plant Research Program

Discovery request set number: Five

Response prepared by or under the direction of: Paul F. McGlynn and Kamran Ali

Response date: November 19, 2018

These data requests are directed to whichever of the following entities has the knowledge to answer these data requests: Transource Maryland, LLC ("Transource MD"), Transource Energy, AEP Transmission Holding Company, LLC, American Electric Power Company, Inc. ("AEP"), American Electric Power Service Corporation ("AEPSC"), and/or PJM Interconnection, L.L.C. ("PJM"):

### Data Request PPRP 05-03:

Has the Applicant considered or discussed, or have any knowledge of anyone – including PJM - considering or discussing, an alternative that would replace Transource's proposed new Furnace Run-Conastone double-circuit 230 kV line with a new Furnace Run-Conastone 230 kV line and a new Furnace Run-Graceton 230 kV line, which includes the "Conceptual Alternative" described below? If so, please provide a thorough summary in detail.

Conceptual Alternative to Transource's proposed new Furnace Run-Conastone double-circuit 230 kV line with a new Furnace Run-Conastone 230 kV line and a new Furnace Run-Graceton 230 kV line.

- Transource's proposed Furnace Run Substation and its tap into the Peach Bottom-Three Mile Island 500 kV line would not change with the Conceptual Alternative.
- o Incremental terminal equipment in the Conastone Substation would decrease with the Conceptual Alternative's single incremental 230 kV line terminating in that substation.
- o Incremental terminal equipment would have to be added in the Graceton Substation to accommodate the new incremental 230 kV line into that substation with the Conceptual Alternative.
- o BGE's rebuild of the Conastone-Northwest double circuit 230 kV line would be modeled as part of the Conceptual Alternative just as it was with the IEC project.

- To the extent practicable, the conductors to be modeled for the Conceptual Alternative would be the same as those used by PPL when it rebuilt the Conastone-Otter Creek and Graceton-Manor 230 kV lines—1590 KCMIL 45/7 ACSR "Lapwing" conductor with a summer normal rating of 1626 Amps (647 MVA @ 230 kV) and summer emergency rate of 2013 Amps (801 MVA @ 230 kV). That same conductor should be modeled for the rebuilt portion of BGE's Graceton-Manor 230 kV line noted above.
- The conductors to be installed on BGE's portion of the new Furnace Run-Conastone 230 kV line and a rebuild, if any, of its portion of the Conastone-Otter Creek 230 kV line, would be determined by BGE given the capability of the existing double-circuit structures and consistent with good utility practices.

### Response:

PJM has conducted an analysis that modeled the "Conceptual Alternative" cited above. A summer 2023 generator deliverability study identified two single-contingency (n-1) thermal criteria violations:

- 1. Furnace Run-Conastone 230 kV line overload for the loss of the Conastone-Peach Bottom 500 kV line
- 2. Furnace Run-Graceton 230 kV line overload for the loss of the Conastone-Peach Bottom 500 kV line

These results were identified from only a subset of RTEP process tests that PJM conducts to ensure compliance with reliability criteria. For example, other tests performed to ensure compliance with reliability would include an n-1-1 analysis. If this "Conceptual Alternative" were to have been submitted as a project proposal through the 2014/2015 Long-term Proposal Window, it would not have moved forward with any additional evaluation – including that for market efficiency benefits – because it creates reliability violations.

## PPL Electric Utilities Corporation Response to Interrogatories of TRANSOURCE PA, Set I Dated October 2, 2018 Docket Nos. A-2017-2640195 and A-2017-2640200

Q.4

Has PPL Electric conducted any analyses, studies, or reviews to determine whether PPL Electric's Otter Creek to Conastone could be modified by adding a second circuit in order to provide the equivalent electrical characteristics (as measured by the performance criteria below) of the proposed Furnace Run-Conastone portion of the IEC Project? Please describe in detail any such modifications, and provide any analyses, reviews, plans, documents, or opinions related to such modifications.

### Performance criteria

1800 / 2400 MVA summer normal / emergency rating with the following parameters:

R = 0, 00134928 pu

X = 0.0146981 pu

B = 0.0608184 pu

A.4

PPL Electric has not conducted analyses or studies or reviews to determine if adding a second circuit to the Otter Creek to Conestone line would provide equivalent electrical characteristics as measured by the performance criteria cited in the above question #4.

### PPL Electric Utilities Corporation Response to Interrogatories of TRANSOURCE PA, Set I Dated October 2, 2018 Docket Nos. A-2017-2640195 and A-2017-2640200

Q.8

Has PPL Electric conducted any analyses, studies, or reviews to determine whether PPL Electric's Graceton-Manor could be modified by adding a second circuit in order to provide the equivalent electrical characteristics (as measured by the performance criteria below) of the proposed Furnace Run-Conastone portion of the IEC Project? Please describe in detail any such modifications, and provide any analyses, reviews, plans, documents, or opinions related to such modifications.

### Performance criteria

1800 / 2400 MVA summer normal / emergency rating with the following parameters:

R = 0.00134928 pu

X = 0.0146981 pu

B = 0.0608184 pu

**8.A** 

(

PPL Electric has not conducted analyses or studies or reviews to determine if adding a second circuit to the Graceton-Manor line would provide equivalent electrical characteristics as measured by the performance criteria cited in the above question #8.

## PPL Electric Utilities Corporation Response to Interrogatories of TRANSOURCE PA, Set I Dated October 2, 2018 Docket Nos. A-2017-2640195 and A-2017-2640200

Q.10

In PPL Electric Utilities Corporation Response to Interrogatories of Office of Consumer Advocate, Set XII, Q.4, it was stated that "there is ability to utilize conductors with a higher capacity rating" for the Otter Creek-Conastone transmission line.

a. Based upon all studies and analyses completed or known at the time of the integratory response, please provide the maximum rating of any conductors studied along with the conductor specifications that can be added to the existing structures without modification to the structures or land rights, and the related summer normal and summer emergency ratings in MVA and the associated R, X and B pu values. Please provide the engineer(s) responsible for any assessment supporting this determination, their contact information and qualifications along with any applicable professional certifications that they possess.

.A.10

PPL Electric performed a preliminary review that showed that almost all existing structures could accommodate higher capacity conductors. PPL Electric has not performed the detailed engineering or planning studies required to select a specific higher capacity conductor or determine specific modifications to structures or land rights that may be required. The review was performed by Mr. Horst Lehmann. Mr. Lehmann is employed by PPL Electric Utilities, Two North Ninth Street Allentown, PA 18101. Mr. Lehmann has over ten years of electric utility operating experience including six years in the design of transmission lines. Mr. Lehmann has B.S. degrees in both Electrical Engineering and Economics from Rensselaer Polytechnic Institute and is a licensed Professional Engineer in the Commonwealth of Pennsylvania.

### Supplemental Information provided 10/31/18:

PPL Electric utilized UHS 1949.6 45/7 ACSS TW Athabaska and UHS 2153.8 60/19 ACSS TW Powder conductors as representative examples for the purpose of determining feasibility of reconductoring

the existing transmission structures with higher capacity conductors. The maximum rating for such conductors per PPL Electric's rating methodology would be 180 Degrees C. However, PPL Electric has not conducted the planning and engineering studies necessary to select a specific higher capacity conductor that would be utilized or determined the applicable rating of any such conductor, nor did it do the engineering and planning studies necessary to determine what the maximum rating of the identified conductors would be on the PPL Electric system.

### PPL Electric Utilities Corporation Response to Interrogatories of TRANSOURCE PA, Set I Dated October 2, 2018 Docket Nos. A-2017-2640195 and A-2017-2640200

Q.11

In PPL Electric Utilities Corporation Response to Interrogatories of Office of Consumer Advocate, Set XII, Q.11, it was stated that "there is ability to utilize conductors with a higher capacity rating" for the rebuilt portions of the Graceton-Manor transmission line.

a. Based upon all studies and analyses completed or known at the time of the integratory response, please provide the maximum rating of any conductors studied along with the conductor specifications that can be added to the existing structures without modification to the structures or land rights, and the related summer normal and summer emergency ratings in MVA and the associated R, X and B pu values. Please provide the names of any engineer(s) or other persons responsible for any assessment supporting this determination, their contact information and qualifications along with any applicable professional certifications that they possess.

A.11

1 -- . .

PPL Electric performed a preliminary review that showed that almost all existing structures could accommodate higher capacity conductors. PPL Electric has not performed the detailed engineering or planning studies required to select a specific higher capacity conductor or determine specific modifications to structures or land rights that may be required. The review was performed by Mr. Horst Lehmann. Mr. Lehmann is employed by PPL Electric Utilities, Two North Ninth Street Allentown, PA 18101. Mr. Lehmann has over ten years of electric utility operating experience including six years in the design of transmission lines. Mr. Lehmann has B.S. degrees in both Electrical Engineering and Economics from Rensselaer Polytechnic Institute and is a licensed Professional Engineer in the Commonwealth of Pennsylvania.

### Supplemental Information provided 10/31/18:

PPL Electric utilized UHS 1949.6 45/7 ACSS TW Athabaska and UHS 2153.8 60/19 ACSS TW Powder conductors as representative examples for the purpose of determining feasibility of reconductoring the existing transmission structures with higher capacity conductors.

The maximum rating for such conductors per PPL Electric's rating methodology would be 180 Degrees C. However, PPL Electric has not conducted the planning and engineering studies necessary to select a specific higher capacity conductor that would be utilized or determined the applicable rating of any such conductor, nor did it do the engineering and planning studies necessary to determine what the maximum rating of the identified conductors would be on the PPL Electric system.

Responses of the Office of Consumer Advocate to Transource's Interrogatories and Requests for Production of Documents SET III

### Transource to OCA-III-7

7. Re OCA Statement No. 3, page 21. Please describe in detail all the regulatory or other approvals that have been obtained in connection with the 206 MW and 545 GWh/year energy efficiency resources and the 3,723 MW of renewable energy predicted by Mr. Crandall. To the extent regulatory or other approvals are required but have not yet been obtained, please describe in detail the process and standards required to obtain such approval, and describe in detail the basis supporting Mr. Crandall's prediction that these resources will in fact occur and be placed in service.

### Answer:

To clarify the premise of the question, this is not Mr. Crandall's prediction of what will occur. It is Mr. Crandall's recognition of the State mandate and utility IRP plans to fulfill the mandate — it is much more than simply Mr. Crandall's forecast. The point, as Mr. Crandall stated in his direct testimony, is that PJM did not consider the impact of the Virginia mandate nor the utilities' plans to achieve it. In effect, PJM is forecasting that Virginia's mandate and the utilities' plans result in no load reductions, i.e., have zero impact.

The Grid Transformation and Security Act became effective in Virginia in March 2018. In May 2018 Dominion Energy filed its 2018 Integrated Resource Plan. As is customary, it is seeking approval from the Virginia State Corporation Commission to use various combustion and non-combustion resources to meet their IRP Plan goals from 2019-2033.

Prepared by: Geoffrey Crandall

Responses of the Office of Consumer Advocate to Transource's Interrogatories and Requests for Production of Documents SET III

### Transource to OCA-III-8

Re OCA Statement No. 3, page 23. Fully explain how the District of Columbia City Council will achieve that one-half of the electric energy used in the District of Columbia by 2032 be supplied by solar photovoltaics.

### Answer:

In July 2016 Mayor Bowser signed into law a 50% renewable energy mandate. To be obtained by 2032. The District of Columbia Government Mayor's Office Press Release and a relevant news article provides further details on the establishment of and requirement for a 50% renewable energy target in the District of Columbia.

See: <a href="https://www.utilitydive.com/news/district-of-columbia-mayor-signs-50-renewable-energy-standard/423265/">https://www.utilitydive.com/news/district-of-columbia-mayor-signs-50-renewable-energy-standard/423265/</a>

PJM did not consider this; effectively forecasting it will have zero impact on loads. Whether they actually achieve 50%, or more, or less, is not the point. Anything DC and PEPCO actually accomplish is not being considered in PJMs plans.

Table 2 of Mr. Crandall's Direct Testimony does not contain assumptions regarding the viability of the District of Columbia accomplishing a 50% renewables level by 2032. Instead the renewable energy values were based on the technical potential of renewables study done by the D.C. Government Department of Environment. That study showed a technical potential in DC for renewables of 2,498,000 MWH, which is about 13% of the DC energy use. Mr. Crandall assumed the market potential would be 5% of technical potential, which is about 0.63% of the DC energy use, not 50%. The assumption was 1/80 of the 50% mandate, which is conservative.

Responses of the Office of Consumer Advocate to Transource's Interrogatories and Requests for Production of Documents SET III

### Transource to OCA-III-5

5. OCA Statement No. 3, page 20. Provide all calculations for how the GTSA will reduce customers overall annual energy usage by 805 GWh and peak demand by 304 MW by 2033.

### Answer:

See the Dominion Energy correspondence to the Virginia State Corporation Commission page 4 for the basis of the estimates of 805 GWh annual reduction and the peak demand reduction of 304 MW by 2033. See:

https://www.dominionenergy.com/library/domcom/media/about-us/making-energy/2018-irp.pdf

The impacts emanate from Dominion Energy's Demand Side Management/energy efficiency programs. This information was provided by Dominion Energy President Mr. Paul Koonce as part of the 2018 Integrated Resource Plan submission on May 1, 2018 to the Virginia State Corporation Commission.

Prepared by: Geoffrey Crandall

Responses of the Office of Consumer Advocate to Transource's Interrogatories and Requests for Production of Documents SET III

### Transource to OCA-III-19

19. Re: OCA Statement No. 3, page 8, lines 3-4. Please provide all supporting analysis, studies or work papers supporting the statement that "reducing load will mitigate the constraint" which were relied upon or considered to prepare this testimony.

### Answer:

Please refer to OCA Statement No. 3, page 8, lines 1-15. If the load on the higher cost side of the transmission constraint is too great for the transmission system to carry from the lower cost side, and if that then causes the higher cost generation in the higher cost area to be dispatched to alleviate the load on the transmission system, then reducing load in the higher cost area will also reduce the load on the transmission system. Dispatching generation and reducing load in the higher cost area both reduce the power flow across the congested transmission lines.

Prepared by: Geoffrey Crandall

Application of Transource Pennsylvania, LLC Filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the 230 kV Transmission Line Associated with the Independence Energy Connection-East Project in Portions of York County, Pennsylvania;

Docket No. A-2017-2640195

Application of Transource Pennsylvania, LLC Filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the 230 kV Transmission Line Associated with the Independence Energy Connection — West Project in Portions of Franklin County, Pennsylvania;

Docket No. A-2017-2640200

### YORK COUNTY PLANNING COMMISSION'S RESPONSES TO TRANSOURCE PENNSYLVANIA, LLC'S INTERROGATORIES AND REQUESTS FOR PRODUCTION OF DOCUMENTS, SET I

7. Based on Mr. Gobrecht's review of the Project, please provide an estimate of the proposed funding amount for the Land Impact Mitigation Fund.

RESPONSE: We do not have an estimate at this time. The funding amount should be sufficient to offset the impacts to the following: conservation easements, designated natural areas, habitat corridors, wetlands, and high quality streams within the right-of-way. The funding amount should also cover the costs of BMP design and construction to offset stormwater impacts within the right-of-way.

PROVIDED BY:

Wade Gobrecht

DATE:

October 22, 2018

Application of Transource Pennsylvania, LLC Filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the 230 kV Transmission Line Associated with the Independence Energy Connection-East Project in Portions of York County, Pennsylvania;

Docket No. A-2017-2640195

Application of Transource Pennsylvania, LLC Filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the 230 kV Transmission Line Associated with the Independence Energy Connection — West Project in Portions of Franklin County, Pennsylvania;

Docket No. A-2017-2640200

### YORK COUNTY PLANNING COMMISSION'S RESPONSES TO TRANSOURCE PENNSYLVANIA, LLC'S INTERROGATORIES AND REQUESTS FOR PRODUCTION OF DOCUMENTS, SET I

3. Re YCPC Statement No. 1, page 13. Does the Land Mitigation Fund currently exist? If yes, how is it funded and how are the funds used and please provide a copy of any guidance documents, charters, or other documents, that describe the implementation, execution, and funding of the referenced "Land Impact Mitigation Fund."

RESPONSE: No.

PROVIDED BY:

Wade Gobrecht

DATE:

October 22, 2018

### BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

Application of Transource Pennsylvania, LLC: for approval of the Siting and Construction of: the 230 kV Transmission Lines Associated: with the Independence Energy Connection - : East and West Projects in portions of Franklin:

and York Counties, Pennsylvania

Petition of Transource Pennsylvania, LLC for a finding that a building to shelter control equipment at the Rice Substation in Franklin County, Pennsylvania is reasonably necessary for the convenience or welfare of the public

Petition of Transource Pennsylvania, LLC for a finding that a building to shelter control equipment at the Furnace Run Substation in York County, Pennsylvania is reasonably necessary for the convenience or welfare of the public

Application of Transource Pennsylvania, LLC for approval to acquire a certain portion of the lands of various landowners in York and Franklin Counties, Pennsylvania for the siting and construction of the 230 kV Transmission Lines associated with the Independence Energy Connection — East and West Projects as necessary or proper for the service, accommodation, convenience or safety of the public

Docket No. A-2017-2640195 Docket No. A-2017-2640200

Docket No. P-2018-3001878

Docket No. P-2018-3001883

Docket No. A-2018-3001881, et al.

### TRANSOURCE PENNSYLVANIA, LLC

### REBUTTAL TESTIMONY

### **KAMRAN ALI**

STATEMENT NO. 2-R

Date: November 27, 2018

1	Q.	Please state your name and business address.
2	A.	My name is Kamran Ali. My business address is 8500 Smiths Mill Road, 2 <sup>nd</sup> Floor, New
3		Albany, OH 43054.
4		
5	Q.	Have you previously provided Direct Testimony in this proceeding?
6	A.	Yes. Transource Pennsylvania, LLC ("Transource PA" or the "Company") Statemen
7		No. 2 is my written Direct Testimony.
8		
9	Q.	Please describe the purpose of your Rebuttal Testimony.
10	A.	In this rebuttal testimony I will address several specific topics raised by intervenors and
11		in the public hearings that relate to the overall public need for the Project; Mr. Weber
12		includes these topics in his summarization of "Need Issues" in his Rebuttal Testimony
13		Specifically, I will discuss the following:
14		• The claim that the Project has no reliability benefits by describing how the
15		Project provides broad regional and specific local reliability benefits.
16		• The claim that the value of the Project has deteriorated since its approval by
17		PJM by demonstrating that congestion remains a significant issue that
18		adversely impacts system planning in PJM.
19		• The claim that this congestion issue should be addressed with investments and
20		programs in Maryland and Virginia through rebuttal of multiple points made
21		by OCA Witness Crandall.
22		• The validity of the PROMOD model for this type of transmission system
23		planning.

1		• How from a technical standpoint the "Conceptual Alternative" described by
2		Witness Weber represents a practical and more sophisticated implementation
3		of Mr. Lanzalotta's general concept for using existing transmission line
4		corridors owned by PPL Electric as a replacement for the East Leg of the
5		Project
6		
7	Q.	Are you sponsoring any exhibits with your Rebuttal Testimony?
8	A.	Yes. I am sponsoring the following exhibits:
9		• TPA Exhibit No. KA-1R: PJM's October 24, 2018 Market Efficiency Update
10		Presentation
11		
12		IEC PROJECT RELIABILITY BENEFITS
13	Q.	The OCA Witnesses argue that the IEC Project is not required for its reliability
14		benefits (OCA St. No. 2, p. 12). Do you agree?
15	A.	No, the Project provides both broad regional and specific local reliability benefits. The
16		fact that Market Efficiency is the primary driver of the IEC Project does not change the
17		fact that it also provides reliability benefits. PJM has clearly demonstrated that the
<del>18</del>		project has the relevant, direct benefit of resolving specific reliability violations as
<del>19</del>		presented in the September 13, 2018 Transmission Expansion Advisory Committee
<del>20</del>		("TEAC") meeting, in addition to the inherent reliability benefit provided when the
<del>21</del>		capability of the system is improved.

As further discussed by witnesses Herling and Horger, there would be significant

North American Electric Reliability Corporation ("NERC") reliability violations if

<del>22</del>

<del>23</del>

Project 9A was not built; in other words, Project 9A does address specific local reliability needs. If Project 9A were to be removed from PJM's Regional Transmission Expansion Planning ("RTEP"), then it would be necessary to solicit, analyze and plan other solutions for those violations, with the attendant costs for those other solutions and the detriment of the reliability violations being borne by the residential, industrial, and commercial end-users affected by those reliability violations, including a significant number of customers in Pennsylvania. Allowing such violations to occur is entirely unacceptable from an engineering point of view, and PJM's planning process approved by the Federal Energy Regulatory Commission ("FERC") has as one of its primary aims to prevent such violations from actually occurring. Following Mr. Lanzalotta's recommendation to disregard the Project's reliability benefits would result in a completely unacceptable result.

+

<del>10</del>

<del>12</del>

- Q. Mr. Shaw states that it is more reliable for generators to be located closer to load than to construct transmission lines (Shaw St. No. 1, p. 15). Please respond.
- A. That is actually not true in practice. Reliability is not a function of location but strength of the underlying system. Regional Transmission Organizations, such as PJM, fundamentally function because the ability to leverage greater geographic diversity provides both improved reliability as well as economic benefit. Mr. Shaw seems to be advocating a return to a regulatory structure that has not existed for decades, when individual local utilities only interacted with each other on a limited basis and needed to build significant generation to plan for generation outages within their specific regions. Under the current structure, Independent Power Producers have the ability to site new

generation closer to the load centers, but we are seeing much more new generation sited
in Pennsylvania closer to the Marcellus natural gas reserves than is being sited near
Baltimore

### THE CONTINUED ECONOMIC VALUE OF THE IEC PROJECT

- Q. OCA witness Lanzalotta states "I conclude that the original need for this Project [AP South congestion] was based on economic conditions that simply no longer exist" (OCA St. No. 2, p. 18). Do you agree with this conclusion?
- 9 A. No, not at all. As discussed in more detail by Witnesses Herling and Horger, the need for Project 9A is based on detailed forward-looking analysis of the electric system in PJM, which was most recently re-affirmed based on updated models in September 2018. These updated models already incorporated the 2018 Load Forecast that Mr. Lanzalotta notes in his testimony.

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- Q. Is it appropriate to draw the conclusion that the need for the Project is going away in the future by comparing the projected Summer Peak Loads in the 2015 and 2018 PJM Load Forecasts?
  - No. First of all, Mr. Lanzalotta fails to note that PJM's load forecasting methodology was significantly revised after the 2015 Load Forecast was published, so the 2015 to 2018 comparison of projected Summer Peak Loads is not valid and certainly not relevant in assessing the value of Project 9A. The methodology revisions were adopted to further ensure that PJM's Load Forecasts, which are used consistently by PJM in connection with all of its RTEP and Capacity Market analyses, involving thousands of projects and

transactions, appropriately capture all relevant factors. That modified methodology was used to develop the 2018 PJM Load Forecast.

Additionally, Mr. Lanzalotta's focus on Peak Load is not meaningful when discussing congestion in PJM's electric energy market. Congestion occurs during a wide variety of hours at many different load levels. This is because load is only one factor in congestion. Congestion occurs when the most cost effective generation is unable to serve the load due to physical limitations of the transmission system.

Although he eventually draws the wrong conclusion, Mr. Lanzalotta is actually correct when he notes that the results from actual markets are volatile. This volatility is natural and expected when dealing with a complicated system with large numbers of variable factors. An illustration of Mr. Lanzalotta's error can be seen in his Table 2, which shows actual Summer Peaks for 2017 in certain zones being lower than their actual peaks for 2014 (OCA St. No. 2, p. 16). Mr. Lanzalotta fails to show that latest forecasted values for 2020 were lower than the actual summer peaks for 2016 and higher than the actual summer peaks for 2017. Such a comparison of actual and forecasted loads is not meaningful to begin with, but in any case the data does not support the ultimate conclusion Mr. Lanzalotta eventually reaches: namely that the need for the Project would go away on its own. That would be an irresponsible approach to planning the transmission system.

I have added this information in Table 1, which supplements Mr. Lanzalotta's Table 2, with 2016 values taken from the "Unrestricted" Column from Table B-1 from the 2017 PJM Load Forecast Report<sup>1</sup>.

<sup>&</sup>lt;sup>1</sup> https://pim.com/-/media/library/reports-notices/load-forecast/2017-load-forecast-report.ashx?la=en.

Table 1

	Actual and Forecast Peak Loads				
	Actual Summer Peak			Forecast 2020 Peak	
	2014	2016	2017	2015 Forecast	2018 Forecast
BGE	6,666	6,932	6,449	7,457	6,753
Pepco	6,346	6,584	6,098	6,853	6,405
DOM	18,761	19,559	18,903	22,068	19,858
Total	31,773	33,075	31,450	36,378	33,016

As shown in this table, actual summer peaks are volatile. This is not surprising, as peak loads can be highly variable from year to year with one of the largest variable factors being the weather. The load forecasts prepared by PJM and used in the Market Efficiency analyses are intended to represent the middle of an expected range of possible values, not clairvoyant predictions of what will occur in a given year.

The significant underlying point is that it would be an incorrect conclusion to assume that the lower Summer Peak Load number in the 2018 PJM Load Forecast means that the load is forecasted to be materially different from the load projected in the 2015 PJM Load Forecast, which was prepared using a different methodology and which lacks the refinements adopted after the 2015 PJM Load Forecast was published. The correct conclusion to draw from this volatility is that the benefits of the Project are likely to be higher than computed based on these conservative assumptions.

Q.

Mr. Lanzalotta states that AP South reactive interface congestion has been decreasing. Can you draw the conclusion from this statement, even if true, that the IEC Project is no longer needed?

No. It is important to keep in mind that congestion on a given facility does not occur in isolation. As a matter of background in interpreting data about transmission congestion, one must note that only the most limiting factors at any given time are listed as congested. The list of congested facilities provides no information about how much congestion would have existed on other facilities if any particular constraint had not been a problem. For example, Slides 24-27 of PJM's October 24, 2018 Market Efficiency Update Presentation

[https://pjm.com/-/media/committees-groups/committees/teac/20181024-market-

efficiency/20181024-market-efficiency-update.ashx] show the list of Top 25 Congestion Constraints from 2017 and details which of those facilities already have approved system upgrades. *See* TPA Exhibit No. KA-1R. Those upgrades are assumed to be complete in PJM's forward looking models.

The need for, and benefits of, any particular future system upgrade cannot be evaluated simply by looking at a list of congested facilities. The only way to evaluate system needs or specific proposals is to perform detailed simulations using forward looking models within the PJM RTEP construct. Mr. Lanzalotta has not performed any analysis or provided any evidence to support his claims.

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<del>Q.</del>

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A.

Mr. Ali, from your perspective as an electric system planner, how does this chronic congestion adversely impact regional system planning?

Transmission congestion adversely affecting market efficiency is bad for everybody. A cornerstone of why FERC has fostered the development of Regional Transmission Organizations, or RTOs, is that having a regional market for electricity lowers the overall

cost of electricity and improves the reliability of electric service, providing benefits to millions of people. With that in mind, chronic congestion of transmission facilities, such as the congestion that has been experienced for years along the AP South Reactive Interface, has negative consequences that go beyond the hundreds of millions of dollars in congestion costs in past years and the hundreds of millions of dollars in transmission congestion costs that are forecasted to be incurred if Project 9A was not constructed.

The negative consequences would also include a decreased ability for exporters of electricity, such as power generators in Pennsylvania, to be able sell energy in the areas where they would be competitive but for the electric transmission congestion. Congestion also decreases the ability of both power producers and regulators such as the Pennsylvania Public Utility Commission to advance the most efficient use of existing and future generating resources; for example, enabling increased off-system sales or in some cases delaying the need to construct additional infrastructure.

As a system planner, my goal is to assess the reliability and economic performance of the system using a reasonable forecast and address reliability and economic constraints so customers across PJM can enjoy safe, reliable and cost-effective electric service.

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#### What is the typical useful life of transmission assets, such as the Project?

The typical useful life of transmission assets like the Project is well beyond 50 years.

- The benefits considered by PJM's market efficiency analysis methodology are only for a 15-year planning horizon. Are there benefits the Project brings beyond this horizon?
- 4 A. Yes, these transmission assets will bring market efficiency and reliability benefits well
  5 beyond the 15-year horizon analyzed by PJM. These benefits are not considered in
  6 PJM's market efficiency analysis but should not be ignored in considering the broad
  7 value of the Project.

9 Q. Mr. Shaw argues that the IEC Project economics are dependent upon low natural gas costs in Pennsylvania (Shaw St. No. 1, p. 17). How do you respond?

I disagree with his analysis. PJM conducted sensitivity analyses varying the price of natural gas, to ascertain and further validate the fact that the Project is beneficial and that the Project's costs are significantly outweighed by the value of the benefits of the Project. The economics of the IEC Project are dependent on a number of factors, and any single factor could be offset by a combination of other factors. The complexity of this factor interdependence is the reason it is necessary to conduct specialized analysis to forecast in an informed and principled manner the conditions and needs of the electric transmission grid during PJM's planning horizon. As explained by Witnesses Herling and Horger more in detail, the modeling and analysis of Project 9A as a market efficiency upgrade in PJM's RTEP includes forecasts of the price of natural gas during the relevant planning horizon.

A.

1 2	NON-TRANSMISSION ALTERNATIVES WILL NOT ELIMINATE CONGESTION ON AP SOUTH			
3 4	Q.	OCA Witness Crandall argues that Transource PA and PJM did not provide a		
5		useful characterization of when congestion occurs on the AP South interface (OCA		
6		St. No. 3, p. 14). Do you agree with Mr. Crandall?		
7	A.	No. Mr. Crandall's statement seems to be rooted in a lack of understanding about the		
8		factors involved in the economic effects of market inefficiency resulting from electric		
9		transmission congestion. As explained by Witnesses Herling and Horger, transmission		
10		congestion can, and does, occur under a myriad of conditions. In market efficiency		
11		analysis, factors such as peak load requirements during high-use times (such as a		
12		particularly cold February morning or a particularly hot summer day) are very important.		
13		The factors causing electric transmission congestion are tremendously varied, and a		
14		particular set of factors can occur in different seasons of the year, and different times of		
15		the day. From that point of view, the description that the Company has provided in		
16		testimony is informative and useful, and focuses on what is important about electric		
17		transmission congestion relief, the benefits that the Project provides, and the reasons why		
18		the Project is needed.		
19				
20	Q.	Mr. Crandall also argues that "any non-transmission alternative resource may		
21		contribute to mitigating the potential for congestion, irrespective of when the		
22		resource is available, because the congestion can occur at any time" (OCA St. No. 3,		
23		p. 14). Is Mr. Crandall correct?		
24	A.	No, not at all. Mr. Crandall compounds his error about PJM's market efficiency analysis		
25		by advancing the untenable position that it does not matter whether the non-transmission		

alternative resources he cites, which by and large are intermittent renewable resources, cannot be dispatched when needed. It is a logical fallacy to conclude that because congestion can occur at any time (which is true) non-transmission resources that are available sometimes only are a substitute for addressing transmission congestion (which is most definitely not true). Obviously, the fact that the non-transmission resources mentioned by Mr. Crandall cannot be dispatched in the particular hours when they may be most needed only aggravates the fact that such resources have not resolved the congestion in the AP South Reactive interface for years. Most importantly and despite Mr. Crandall's claims, non-transmission resources are not projected to even make a dent in the considerable transmission congestion that would remain in the AP South Reactive Interface if Project 9A was not constructed and placed in service.

The approach advanced by Mr. Crandall would be completely ineffective in addressing any transmission congestion. Suffice it to highlight that *none* of the 41 proposals submitted to PJM during its 2014/15 Long-term proposal Window calling for *solutions* to the transmission congestion problem in the AP South Reactive Interface proposed a non-transmission resource of the kind that Mr. Crandall argues for as an alternative.

It also bears mentioning that Mr. Crandall's position is irreconcilable with the fact that PJM's market efficiency analysis employs models and forecasts, including power flow, load, and generating resources, that extensively and thoroughly take into consideration the projected addition or retirement of non-transmission resources of the kind listed by Mr. Crandall. It is erroneous to assume that PJM's analysis failed to take into consideration a realistic and well-reasoned forecast of the availability and effect of

such additions and retirements over the planning horizon on the transmission congestion problem affecting the AP South Reactive Interface specifically and the PJM service area generally. On the contrary, PJM's market efficiency analysis uses sophisticated engineering and economic planning tools to determine what are the most effective and beneficial solutions for addressing market efficiency, as well as reliability, problems in its footprint, and selected Project 9A as the best solution to the transmission congestion in the AP South Reactive interface after extensive analysis, subsequently validated multiple times to re-confirm that the project continues to be beneficial and needed.

A.

- Q. OCA witness Crandall argues that non-transmission alternatives will reduce congestion in the AP South Reactive Interface and specifically references certain portions of another utility's integrated resource plan ("IRP") in support of his argument. Do you agree that the charts in that IRP support Mr. Crandall's conclusions that non-transmission alternatives will reduce congestion on AP South are flawed?
  - No. I do not have information about how charts in the IRP referenced by Mr. Crandall were prepared, but what those charts show is that the demand for new energy and capacity greatly exceeds the level of annual energy savings and capacity projected in the charts. This tremendous demand for energy and capacity requires a multi-faceted approach including transmission solutions in addition to any generation and demand side solutions that can be reasonably projected. The load forecasts included in the IRP referenced by Mr. Crandall support the conclusion that Virginia will need to import significantly *more* power, not *less*, over the next 15 years and fully supports the

conclusion that the IEC Project is necessary to reduce congestion on the AP South

Interface under the assumptions referenced by Mr. Crandall.

Q.

A.

- Mr. Crandall states that he evaluated non-transmission alternatives to the east and south of the AP south interface and considered resources available from 7 AM to 10 PM to be more valuable (OCA St. No. 3, p. 15). Is this a relevant analysis?
  - No, not really. Mr. Crandall's analysis is woefully incomplete, and overlooks very many critical elements that are necessary to form a correct and valid view regarding the benefits of Project 9A and the need for the project. Again, it appears Mr. Crandall's analysis incorrectly assumes that elements like peak load during periods of high electric use have similar relevance for market efficiency analysis as they do for reliability analysis. It is well-understood for those versed in electric transmission planning, and particularly in analysis related to market efficiency and transmission congestion causing detrimental economic effects and market price distortions, that the elements involved in these analyses are not the same. When particular non-transmission resources are or are not available, and whether they are intermittent, are two of a very large number of factors affecting transmission congestion in particular facilities and the shift of congestion from certain facilities to others. Focusing on the elements that Mr. Crandall argues are an "alternative" is incomplete to the degree that the information as analyzed by Mr. Crandall is really meaningless in this context.

- Q. OCA Witness Crandall further argues that renewable generation, energy efficiency and Combined Heat and Power ("CHP") will eliminate the need for the IEC Project (OCA St. No. 3, pp. 15-28). Do you agree with his conclusions?
  - No. As I explained before, Mr. Crandall's view cannot be reconciled with the fact that PJM's market efficiency analysis appropriately takes into consideration those resources. The congestion in the AP South Reactive interface projected to occur during the PJM planning horizon requires a solution that goes well beyond the resources discussed by Mr. Crandall. Further, Mr. Crandall does not offer any evidence to show this "alternative" would provide similar reliability or congestion benefits as the Project. PJM's transmission planning process already appropriately takes into consideration the resources, including renewable generation, energy efficiency, and CHP, that can be reasonably expected to be present during the planning horizon.

Mr. Crandall's position is particularly flawed in that he advances his conclusion without having done any analysis to determine plausible solutions to the congestion problem addressed by Project 9A. Electric transmission planning as a field of study is a highly-specialized area of engineering, requiring sophisticated analytical tools and software, advanced analytical resources, and disciplined analytical approaches to address complex problems involving a very large number of inter-dependent elements and variables. The process by which PJM conducts its analysis to determine what projects are the most beneficial to address the enormous number of needs involved in the Regional Transmission Expansion Plan is an exceedingly thorough one, subject to close and intensive scrutiny by numerous stakeholders, including state regulators, consumer counsel for several states, and competing electric transmission developers, among many

A.

other participants. It is a process geared to maximize the reliability and efficiency of the electric grid in order to provide safe and reliable electric service in a cost-effective manner to several million electric users. An approach as that suggested by Mr. Crandall would not even begin to satisfy the requirements for satisfying the needs of the millions of people who confidently expect electricity will be there when they flip a switch on their wall.

- Q. Do you agree with Mr. Crandall's statement that PJM did not consider energy efficiency, increased solar and wind resources or distributed generation in its analysis? (OCA St. No. 3, pp. 17-18)
- A. No. As explained by PJM's experts, those resources are thoroughly and appropriately taken into consideration in PJM's market efficiency and transmission planning processes. It bears mentioning that the same process followed by PJM to determine the need for and the benefits from the Project is the same process used to determine the need and benefits for thousands of critical transmission projects across its service footprint.

- Q. On page 29 of his testimony, Mr. Crandall provided a summary of non-transmission alternative resources that could potentially be developed. Does this potential for non-transmission resources eliminate the need for the IEC Project?
- A. No, absolutely not. As explained before, to the extent that the type of resources Mr.

  Crandall described are reasonable expected to in fact become part of the electric grid, those resources are already taken into consideration in PJM's planning analysis. The need for the Project has been determined looking at a forecast of what the electric grid

will be over a 15-year planning horizon. As I explained before, the non-transmission resources described by Mr. Crandall are not really an alternative; they simply are not a solution to the congestion problem, but rather (to the extent they can be reasonably forecasted) are already part of the congested transmission grid that the Project improves.

A.

6 PROMOD

Q. Mr. Shaw states that the IEC Project should not be evaluated using the PROMOD model but rather PJM and the Company should use probabilistic weighting (Shaw St. No. 1 p. 17). Do you agree with this statement?

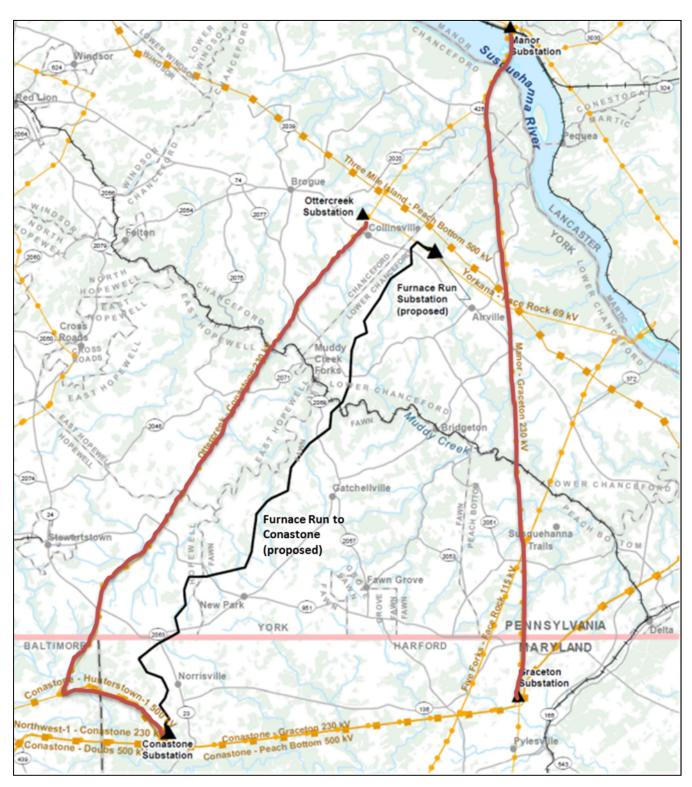
No. PROMOD is an extensively used and accepted software tool used for transmission planning. PJM uses PROMOD to analyze thousands of projects. The process employed by PJM to conduct its market efficiency analysis is not only highly sophisticated, but frankly the state of the art worldwide. A suggestion that the tools employed by PJM to conduct its analysis are weak compared to some other form of analysis are simply without basis.

#### DISCUSSION OF ALTERNATIVES TO THE EAST LEG OF THE PROJECT

- Q. Witness Weber includes in his testimony discussion of alternatives to the East Leg of the Project, specifically, he discusses Mr. Lanzalotta's recommendation to add a new 230-kV circuit to each of the existing PPL tower lines as a replacement to the East Leg of the Project. Please summarize the option suggested by Mr. Lanzalotta.
- A. Mr. Lanzalotta suggests replacing the entire East Leg of the Project, both the new Furnace Run Substation and the new double circuit 230 kV Furnace Run-Conastone line,

with two new single circuit 230 kV lines, one added to the existing towers of the PPL-owned Otter Creek-Conastone 230 kV line and one added to the existing towers of the PPL-owned Manor-Graceton 230 kV line. There is some additional complexity to this option once the suggested new lines enter Maryland, but for purposes of understanding what is suggested by Mr. Lanzalotta it is not necessary to add this detail. I will refer to this as the "Lanzalotta Option" in this testimony. The map presented as Figure 1 below highlights the Lanzalotta Option:

Figure 1



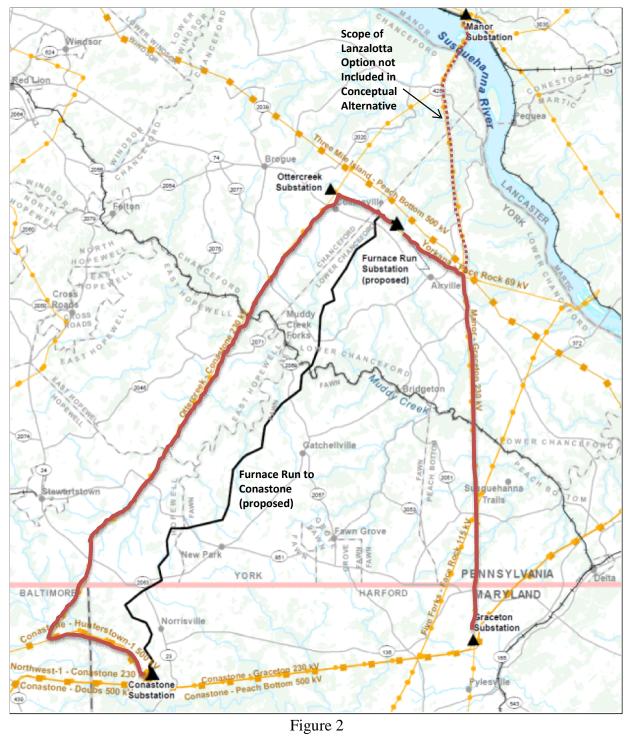
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Q.	Witness Weber also discusses that subsequent to the submittal of Mr. Lanzalotta's
	direct testimony, a party in the Maryland regulatory proceedings for the Project,
	Power Plant Research Program or "PPRP", submitted a data request describing a
	more detailed and technically supported version of the Lanzalotta Option; Mr.
	Weber states that the PPRP referred to this options as the "Conceptual
	Alternative." Please summarize the Conceptual Alternative and highlight
	similarities and differences in the scope of this option versus Lanzalotta option.

The Conceptual Alternative is similar to the Lanzalotta Option in that it includes two new single circuit 230 kV lines, one added to the existing towers of each of the PPL-owned lines. The difference is that the Conceptual Alternative includes the new Furnace Run Substation as the origin point for the new single circuit 230 kV lines. Upon exiting the new Furnace Run Substation, each of the new 230 kV lines would parallel PPL's deenergized Yorkana-Face Rock 69 kV line (within the existing rights-of-way to the extent possible) to the interconnection point with the respective existing 230 kV lines. The map presented as Figure 2 below highlights the Conceptual Alternative versus the Lanzalotta Option.

A.



- 1 Q. From a technical standpoint, how does the Conceptual Alternative represents a
- 2 practical and more sophisticated implementation of the Lanzalotta Option, as stated
- 3 **by Witness Weber?**
- 4 A. As I state above, the Conceptual Alternative is similar to the Lanzalotta Option in that it
- 5 includes two new single circuit 230 kV lines, one added to the existing towers of each of
- 6 the PPL-owned lines. The key difference is that the Conceptual Alternative uses the new
- Furnace Run Substation to tap of the existing Three Mile Island to Peach Bottom 500 kV
- 8 line and as the origin point for the two new single circuit 230 kV lines. This is important
- 9 for two reasons. First, tapping the existing Three Mile Island-Peach Bottom 500 kV line
- is needed to approximate the congestion-relief performance of the East Leg of the
- Project. The Lanzalotta Option, by not tapping the existing 500-kV line, is not a robust
- option to substantially reduce AP South congestion. Second, it eliminates the complexity
- of the Susquehanna River crossing of the Manor-Graceton 230 kV line. As such, the
- 14 Conceptual Alternative represents a practical and more sophisticated implementation of
- the Lanzalotta Option.
- 17 Q. And has the technical performance of the Conceptual Alternative been studied?
- 18 A. Yes, it is my understanding that PJM has studied the technical performance of the
- 19 Conceptual Alternative and the results of this analysis are discussed by Witness Herling.
- 21 Q. Does this conclude your Rebuttal Testimony at this time?
- 22 A. Yes.

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# Market Efficiency Update

Nick Dumitriu, Market Simulation

Transmission Expansion Advisory Committee Market Efficiency Special Session October 24, 2018

PJM TEAC – 10/24/2018 PJM©2018



- Congestion Drivers Criteria
- M2M Constraints
- Overview of Posted Market Efficiency Base Case
- MEPETF Proposed Changes
- Market Efficiency Sensitivities
- Market Efficiency Registration
- Review Simulated Congestion Outputs



## Market Efficiency Guidelines

## Objective of PJM Market Efficiency

#### Operating Agreement: 1.5.7 Development of Economic-based Enhancements or Expansions

- (b) Following PJM Board consideration of the assumptions, the Office of the Interconnection shall perform a market efficiency analysis to compare the costs and benefits of: (i) accelerating reliability-based enhancements or expansions already included in the Regional Transmission Plan that if accelerated also could relieve one or more economic constraints; (ii) modifying reliability-based enhancements or expansions already included in the Regional Transmission Plan that as modified would relieve one or more economic constraints; and (iii) adding new enhancements or expansions that could relieve one or more economic constraints, but for which no reliability-based need has been identified. Economic constraints include, but are not limited to, constraints that cause: (1) significant historical gross congestion; (2) pro-ration of Stage 1B ARR requests as described in section 7.4.2(c) of Schedule 1 of this Agreement; or (3) significant simulated congestion as forecasted in the market efficiency analysis. The timeline for the market efficiency analysis and comparison of the costs and benefits for items 1.5.7(b)(i-iii) is described in the PJM Manuals.
- (c) The process for conducting the market efficiency analysis described in subsection (b) above shall include the following:
- (i) The Office of the Interconnection shall identify and provide to the Transmission Expansion Advisory Committee a list of economic constraints to be evaluated in the market efficiency analysis.

## **Economic Justification for Market Efficiency**

#### Operating Agreement: 1.5.6 Development of the Recommended Regional Transmission Expansion Plan

(i) The recommended plan shall identify enhancements and expansions that relieve transmission constraints and which, in the judgment of the Office of the Interconnection, are economically justified. Such economic expansions and enhancements shall be developed in accordance with the procedures, criteria and analyses described in Sections 1.5.7 and 1.5.8 of this Schedule 6.



## PJM Eligible Congestion Drivers

- In determining eligible congestion drivers PJM will consider all binding flowgates internal to the PJM footprint (including tie lines), current active Market-to-Market flowgates listed in the NERC book of flowgates, and potential future Market-to-Market flowgates between PJM and MISO
- Eligible congestion drivers are selected to focus proposals on significant issues
  - Identified coincident with the opening of market efficiency proposal window
- Only proposals which address one or more of these PJM identified congestion drivers will be evaluated
  - If the proposal does not substantially address a PJM identified congestion driver, or is otherwise substantially deficient or is seriously flawed, it will be rejected and the proposer will be notified
- Facilities below these thresholds are not anticipated to pass the benefit/cost threshold because of the expected cost of an upgrade



## Market Efficiency Criteria for Target Congestion Drivers

- Market Efficiency Criteria
  - Annual simulated congestion frequency of at least 25 hours in each 2023 and 2026 study years
  - Congestion threshold
    - Lower voltage facilities: minimum of \$1 million congestion in each 2023 and 2026 study years
    - Regional facilities: minimum of \$10 million congestion in each 2023 and 2026 study years
    - Interregional facilities: minimum of \$0.5 million congestion in each 2023 and 2026 study years (lower threshold as there may be interregional benefits in addition to the regional benefits)
- Congestion for 2029 study year is considered more speculative and therefore will be monitored in future analysis



## Market Efficiency Exceptions

PJM may not recommend proposals for certain facilities meeting the criteria due to following exceptions:

- Congestion is significantly influenced by a FSA generator or a set of FSAs
- Majority of the congestion was already addressed in previous window(s)
- Simulated congestion for future study years displays a declining trend

Note: PJM reserves right to add other exceptions as necessary.



## Interregional Market Efficiency Project (IMEP) Study

- PJM and MISO will conduct a two year Interregional Market Efficiency Project (IMEP) study in 2018/2019
- Issues identification and benefit determination conducted in each regional process consistent with current effective JOA



- Study progresses in parallel through PJM and MISO regional processes
- Each RTO will develop an economic model and identify issues for which upgrades are being solicited
  - Model and issues identification consistent with region process and practice
- Targeted Market Efficiency Projects (TMEP) are not included in the long term window
- Per PJM-MISO JOA, Interregional Proposals must
  - Address at least one identified issue in each region (could be same issue if identified by both RTOs)
  - be submitted to both PJM and MISO Regional Windows
- PJM and MISO will follow the effective JOA language when analyzing and recommending Interregional Proposals

- Using the same topology as the Market Efficiency process, PJM will define its control areas to align with the CMP processes as described in the MISO-PJM JOA, Attachment 2, Section 3.2.1
- Monitored facilities included in MISO's Market Efficiency process will be combined with the set of contingencies used in both PJM's and MISO's Market Efficiency processes to establish the domain of flowgates that will be tested for eligibility
- Each of these flowgates will be studied in a sensitivity analysis that will establish the flowgates as congestion drivers should they meet either study criteria:
  - GLDF Threshold Study
  - TDF Threshold Study



## Study Criteria Details

### GLDF Threshold Study

 Under the historical control area representation, if any two PJM generating stations at electrically unique locations have a Generation-to-Load Distribution Factor (GLDF) that is 5% or greater, this flowgate will be eligible to be an identified congestion driver in the Market Efficiency process

## TDF Threshold Study

Under the historic control area representation, if any historical control area to historical control
area transaction (Generation-to-Generation transfer) has a 5% or greater Transfer Distribution
Factor (TDF), this flowgate will be eligible to be an identified congestion driver in the Market
Efficiency process



## Updated Market Efficiency Base Case (10-23-2018)

- Posted updated 2023 Base Case (XML files PROMOD 11.1.13 format)
  - Includes MISO feedback received by Oct 11<sup>th</sup>
  - Includes PJM stakeholders feedback received by Oct 23<sup>nd</sup>
  - Model includes all years: 2019, 2023, 2026, 2029
  - Also posted updated noFSA case (PROMOD XML file to remove FSA units)
    - https://www.pjm.com/planning/rtep-development/market-efficiency/economic-planningprocess.aspx
- Posted Additional Files
  - Updated event file
  - 15-years Monte Carlo outage library
  - Current Congestion Output Report (simulated years 2023 and 2026)
- Final Base Case to be posted before the start of Long-Term Window



## 2018/19 Market Efficiency Assumptions

- Posted Market Efficiency Assumptions Whitepaper
  - https://www.pjm.com/-/media/committeesgroups/committees/teac/20181011/20181011-2018-market-efficiency-analysisassumptions.ashx
  - Recently announced First Energy retirements not included (network upgrades not finalized at this time)
- Financial parameters, Discount Rate, Carrying Charge Rate, and NSPL based on the Transmission Cost Information Center spreadsheet
  - http://www.pjm.com/planning/rtep-upgrades-status/cost-allocation-view.aspx
  - Discount Rate: 7.37%
  - Carrying Charge Rate: 12.84%



# MEPETF Proposed Changes - FSA Modeling

Component	Status Quo	PJM Modification	PJM Reasoning
FSA Modeling	Consider all FSA and Suspended ISA resources at time of case build	By default, exclude from the base case the FSA and Suspended ISA resources, and their associated network upgrades at time of case build. FSA sensitivity studies will be used for proposal evaluations, but not for B/C ratio test.	Including FSAs in the Market Efficiency Base Case can result in unrealistic estimates of specific benefits for any system reinforcement due to having significantly more generation than the reserve requirement.
FSA Exception	If FSA or Suspended ISA resources are excluded from the base case at time of case build, TEAC should be notified.	If FSA or Suspended ISA resources are included in the base case at time of case build or mid-cycle update, TEAC will be notified and the assumptions will be reviewed at TEAC on an as needed basis.	In the case of including FSA or suspended ISA resources in the base case, TEAC will be notified and the assumptions will be reviewed at TEAC
Criterion to Include FSAs	Not defined. PJM practice includes all.	In case of a reserve deficiency, include FSA and Suspended ISA resources (as well as the expected network upgrades) ranked by their commercial probability, until the reserve requirement is met.	In the case of including FSA or suspended ISA resources in the base case, TEAC will be notified and the assumptions will be reviewed at TEAC



## MEPETF Proposed Changes - Benefit Adjustment

Component	Status Quo	PJM Modification	PJM Reasoning
Benefit Adjustment for In-Service Date*	N/A	Energy benefits of projects that are proposed to be in service later than the RTEP year will be adjusted to account for any savings forgone due to later in-service date.	It is PJM's goal to address Market Efficiency constraints via transmission solutions by the RTEP year, and to incentivize projects that are designed and proposed to be in service by the RTEP year. Therefore, PJM will adjust energy benefits of projects that are proposed to be in service later than the RTEP year to account for any savings forgone due to later in-service date.

- OA revisions were endorsed at September MC for December 1, 2018 effective date
- Any potential changes will be effective for 18/19 Long Term Window

<sup>\*</sup> Includes 15-year cap.

Will be used as sensitivity if only one proposal per target congestion driver.



## 2018/19 Market Efficiency Sensitivities

Sensitivity	Range
Load Sensitivity	Plus or Minus 2%
Gas Sensitivity	Plus or Minus 20% Henry Hub
No FSA Sensitivity	Remove all units with FSA or suspended ISA status

Note: PJM reserves right to add sensitivities as necessary.

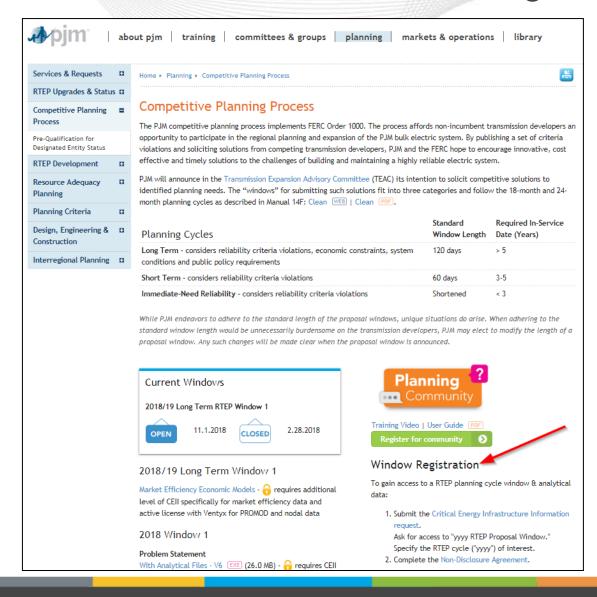


# Market Efficiency RTEP Window Registration

- Register for the 2018/19 RTEP Market Efficiency Window at
  - http://www.pjm.com/planning/competitive-planning-process.aspx
- In the CEII Request form write "Access to the 2018-19 Long Term RTEP Window" as the description of the information requested
- Everyone must register to access the data regardless of prior participation in the PJM Competitive Process



## RTEP Window Registration Screenshot





## Market Efficiency RTEP Window Data Posting

- Market Efficiency Web Page located at
  - http://www.pjm.com/planning/rtep-development/market-efficiency.aspx
- Data will be posted before November 1st 2018
  - Market Efficiency Base Case files for all study years (XML format)
    - Access requires CEII confirmation (PJM and MISO)
    - Access requires PROMOD vendor (ABB) confirmation
  - PROMOD input files: .lib, .eve
  - Benchmark test case and results
- Auxiliary Files
  - Input Assumptions Summary
  - Updated Modeling Document which will provide details of setup and modeling methods
  - Benefit/Cost Evaluation Tool
  - ARR Data



## Market Efficiency Window Opens on November 1st

- Final Market Efficiency 2018/19 base case, problem statement, congestion drivers, and required documentation to be posted before November 1<sup>st</sup> 2018
- PROMOD modeling sensitivity cases will be posted
- Long-Term Market Efficiency Window opens November 1<sup>st</sup> 2018



# Appendix A Proposal Analysis - Process Overview

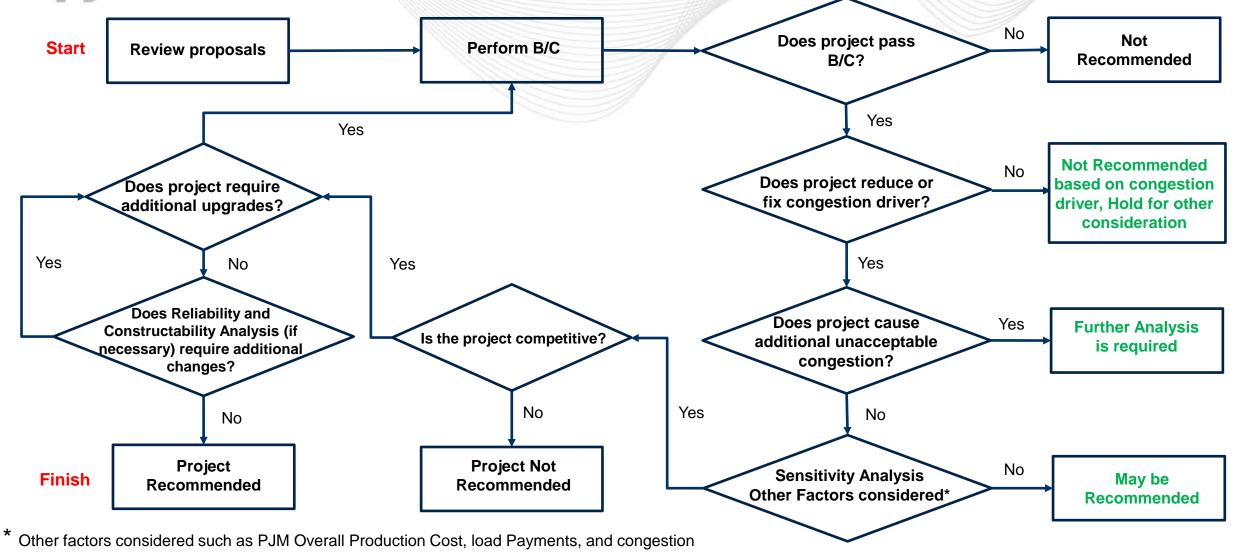


## Proposal Study Approach

- Step 1: Review submitted project data
  - PJM will contact project sponsor for further clarification as needed
- Step 2: First pass of project evaluations assuming proposer supplied data
- Step 3: Group projects by target congestion driver
- Step 4: Perform detailed analysis
  - Analyze proposals including mid cycle incremental updates
  - Sensitivity runs: load forecast, gas forecast, etc.



# Project Selection - Multiple Proposals per Congestion Driver





## **Proposal Selection Criteria**

- Project must reduce or relieve economic congestion on identified PJM constraints
- Project's Benefit/Cost Ratio > 1.25
  - Various scenario analysis may be performed
- Cost
  - Consistent with the OA Schedule 6 section 1.5.7 (g), for a Market Efficiency proposal with costs in excess of \$50 million, an independent review of such costs will be performed
- Projects may be further analyzed for other secondary considerations
  - Zonal/Total Savings
  - Risk Evaluation
  - Sensitivity Evaluation
  - Reliability Impacts



# Appendix B 2017 Historical Congestion



## Top 25 Congestion Causing Constraints in 2017

Rank	Constraint	Туре	Location	Approximate total Market Congestion (Millions)*	% of Total Congestion*	Comment
1	Braidwood - East Frankfort	M2M	ComEd	\$43.4	6.2%	RTEP upgrades expected to reduce congestion (s0756 breaker replacement).
2	Conastone - Peach Bottom	PJM Line	500	\$39.5	5.7%	RTEP upgrades expected to reduce congestion (b2766 substation equipment upgrade).
3	Emilie - Falls	PJM Line	PECO	\$25.1	3.6%	RTEP upgrades expected to reduce congestion (b2774 Emilie - Falls 138 kV line reconductoring). Partial congestion is outage related (work on Alburtis-Branchbu, Bustleto-Crosswic, Emilie-Roll, Crosswic-Wardav).
4	Graceton - Safe Harbor	PJM Line	BGE	\$23.9	3.4%	RTEP upgrades expected to reduce congestion (b2690 Graceton - Safe Harbor 230 kV line reconductoring). Partial congestion is outage related (work on Conaston-Ottcrkpl, Conaston-Peachbot, Manor-Safeharb, Conaston-Hunterst).
5	5004/5005 Interface	Interface	500	\$22.5	3.2%	West - East Transfers.
6	AP South	Interface	500	\$21.6	3.1%	RTEP upgrades expected to reduce congestion (b2752, b2743).
7	Westwood	M2M	MISO	\$19.6	2.8%	
8	Cherry Valley Transformer	M2M	ComEd	\$18.7	2.7%	RTEP upgrades expected to reduce congestion (s0900 parallel xfmr).
9	Carson - Rawlings	PJM Line	Dominion	\$18.2	2.6%	
10	Conastone - Otter Creek	PJM Line	PPL	\$15.1	2.2%	RTEP upgrades expected to reduce congestion (s0233 Otter Creek - Conastone 230 kV line rebuild). Partial congestion is outage related (work on Manor-Safeharb, Conaston-Hunterst).

<sup>\*</sup>Data from 2017 State of Market Report



## Top 25 Congestion Causing Constraints in 2017 (Cont'd)

Rank	Constraint	Туре	Location	Approximate total Market Congestion (Millions)*	% of Total Congestion*	Comment
11	Conastone - Northwest	PJM Line	BGE	\$14.1	2.0%	RTEP upgrades expected to reduce congestion (b2752.7 Conastone - Northwest 230 kV lines reconductor/rebuild).  Partial congestion is outage related (work on Conaston-Northwes, Brighton-Conaston).
12	Three Mile Island	Transformer	500	\$13.3	1.9%	Impacted by Three Mile Island retirement.
13	Butler - Shanorma	PJM Line	APS	\$11.4	1.6%	RTEP upgrades expected to reduce congestion (b2696 substation equipment upgrade at Butler, Shanor Manor and Krendale substations).
14	Lakeview - Greenfield	PJM Line	ATSI	\$10.8	1.5%	Partial congestion is outage related (work on Beaver-Davisbes, Hayes_FE-Davisbes, Lemoyne2 - Wfremont)
15	Alpine - Belvidere	M2M	MISO	\$10.8	1.5%	RTEP upgrades expected to reduce congestion (b2141 Construct Byron - Wayne 345 kV line).
16	Bedington - Black Oak	Interface	500	\$9.5	1.4%	West - East Transfers. Future reactive upgrades expected to reduce congestion.
17	Person - Sedge Hill	PJM Line	Dominion	\$9.3	1.3%	Partial congestion is outage related (work on Carson4-Rogersrd)
18	Lake George - Aetna	M2M	MISO	\$9.2	1.3%	
19	Batesville - Hubble	M2M	MISO	\$8.9	1.3%	RTEP upgrades expected to reduce congestion (b2634 Convert Miami Fort 345 kV substation to a ring bus).
20	Byron - Cherry Valley	M2M	MISO	\$8.0	1.1%	RTEP upgrades expected to reduce congestion (b2141 Construct Byron - Wayne 345 kV line).

\*Data from 2017 State of Market Report



## Top 25 Congestion Causing Constraints in 2017 (Cont'd)

Rank	Constraint	Туре	Location	Approximate total Market Congestion (Millions)*	% of Total Congestion*	Comment
21	AEP - DOM	Interface	500	\$7.8	1.1%	West - East Transfers. Future reactive upgrades expected to reduce congestion.
22	Brunner Island - Yorkanna	PJM Line	Met-Ed	\$7.5	1.1%	RTEP upgrades expected to reduce congestion (b2691 Reconductor Brunner Island - Yorkana 230 kV line).
23	Brokaw - Leroy	M2M	MISO	\$7.3	1.0%	
24	Loretto - Vienna	PJM Line	DPL	\$6.9	1.0%	Partial congestion is outage related (work on Nsalisbur-Pemberton)
25	Pleasant View - Ashburn	PJM Line	Dominion	\$6.8	1.0%	

Top 25	\$389.2
Total Congestion	\$697.6



## Questions?

Email: MarketEfficiencyGroup@pjm.com





- Revision History
  - V1 10/24/2018 Original Version Posted to PJM.com

#### **BEFORE THE** PENNSYLVANIA PUBLIC UTILITY COMMISSION

Application of Transource Pennsylvania, LLC: for approval of the Siting and Construction of : the 230 kV Transmission Lines Associated with the Independence Energy Connection -East and West Projects in portions of Franklin and York Counties, Pennsylvania

Docket No. A-2017-2640195 Docket No. A-2017-2640200

Petition of Transource Pennsylvania, LLC for a finding that a building to shelter control equipment at the Rice Substation in Franklin

Docket No. P-2018-3001878

County, Pennsylvania is reasonably necessary for the convenience or welfare of the public

Petition of Transource Pennsylvania, LLC for a finding that a building to shelter control equipment at the Furnace Run Substation in York County, Pennsylvania is reasonably necessary for the convenience or welfare of the public

Docket No. P-2018-3001883

Application of Transource Pennsylvania, LLC for approval to acquire a certain portion of the lands of various landowners in York and Franklin Counties, Pennsylvania for the siting and construction of the 230 kV Transmission Lines associated with the Independence Energy Connection – East and West Projects as necessarv or proper for the service. accommodation, convenience or safety of the public

Docket No. A-2018-3001881, et al.

#### TRANSOURCE PENNSYLVANIA, LLC

#### REBUTTAL TESTIMONY OF

#### **TIMOTHY HORGER**

STATEMENT NO. 8-R

Date: November 27, 2018

#### Q. Please state your name and business address.

- 2 A. My name is Timothy J. Horger, and my business address is 2750 Monroe Boulevard,
- 3 Audubon, Pennsylvania 19403.

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#### 5 Q. By whom are you employed and in what capacity?

- I am employed by PJM Interconnection, L.L.C ("PJM"), a regional transmission
- 7 organization ("RTO"), as Director of Energy Market Operations.

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#### 9 Q. Please describe your professional experience and educational background.

- As Director of Energy Market Operations, I am responsible for overseeing the execution of the PJM Market systems, including the Day-ahead, Real-time, Financial Transmission Rights ("FTR"), Market Efficiency, and Interregional Market Operations areas. In addition, I am responsible for the design and development of the PJM market systems, facilitation of stakeholder initiatives, strategic market initiatives, and development of
- staff.

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I have been employed by PJM for over sixteen years. Prior to being the Director of Energy Market Operations at PJM, I was the manager of the PJM Interregional Market Operations department, manager of the PJM Market Simulation department, and the Senior Lead Engineer of the Auction Revenue Rights ("ARR") and FTR group. In the role of Interregional Market Operations Manager, my responsibilities included overseeing all market activities associated with interregional market coordination with neighboring areas including Market-to-Market daily congestion management, Congestion

Management Process, Joint and Common Market, Interchange Distribution Calculator Working Group, North America Energy Standards Board, and project support.

In my role as Market Simulation Manger, I was also responsible for overseeing all activities associated with the ARR/FTR Markets and the Market Efficiency Economic Planning process at PJM. This included responsibility for execution and design of the Market Efficiency Analysis, Annual FTR Auctions, ARR Allocations, Long Term and Monthly FTR Auctions, and Incremental ARR analysis. As related to this proceeding, I was responsible for the Market Efficiency analysis associated with the Transource Independence Energy Connection project ("Project 9A").

In my role as Senior Lead Engineer for the ARR/FTR group, I was responsible for leading and conducting all activities related ARR and FTR functions including Incremental ARR analysis, FTR Auction setup and clearing, software design, and stakeholder support. I was also responsible for daily locational marginal price verification, Day-ahead market clearing, power flow analysis, and market congestion studies.

Prior to joining PJM in 2002, I was a Power Systems and Control Engineer at Laser Technology, Inc. where I designed Power and Control Systems for Industry equipment. I also developed power distribution schematics, designed Programmable Logic Controllers, programmed Multiple Axis Motion Control Systems, and designed CE/UL certified equipment.

In addition, I was previously employed at Lockheed Martin Government Electronic Systems as an Electrical Integration Engineer where I led and performed electrical integration design for the U.S. Naval AEGIS Combat System.

#### Q. What academic degrees do you hold?

- 2 A. I hold a Bachelor of Science degree in Electrical Engineering from Drexel University and
- a Master of Science degree in Systems Engineering from Pennsylvania State University.

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- 5 Q. Have you previously provided Direct Testimony in this proceeding?
- 6 A. No. However, on December 27, 2017, PJM Witness Mr. McGlynn submitted Direct
- 7 Testimony which described PJM and its Regional Transmission Expansion Plan
- 8 (commonly referred to as the "RTEP"). More specifically Mr. McGlynn discussed
- 9 Project 9A in the context of the RTEP and why Project 9A is needed to alleviate
- transmission congestion in eastern PJM.
- As of February 28, 2018 Mr. McGlynn's role within PJM changed to Senior
- Director of System Operations, and Mr. McGlynn is no longer Senior Director of System
- Planning. As a result, I am adopting parts of his Direct Testimony relative to PJM's
- regional planning process as my own in this proceeding, and my Rebuttal Testimony
- responds to various assertions concerning Project 9A, PJM, and the RTEP process
- presented in the Direct Testimonies of witnesses Geoffrey C. Crandall and Peter
- 17 Lanzalotta on behalf of the Pennsylvania Office of Consumer Advocate ("OCA") and
- Barron Shaw on behalf of Barron Shaw and Shaw Orchards.
- 19 I will be adopting the following portions of the Direct Testimony of Mr. McGlynn:
- Page 2, line 15 through Page 4, line 11;
  - Page 4, line 18 through Page 8, line 5;
- Page 16, line 11 through page 32, line 2;
- Page 33, line 14 through Page 34, line 5.

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1	Q.	Please summarize your findings.

- 2 A. After reviewing the Direct Testimony and conducting my own review, I believe that:
- PJM conducted the Market Efficiency process which ultimately resulted in the
   recommendation of Project 9A in accordance with its Tariff, Operating
   Agreement, and Manuals;
  - Project 9A provides more overall benefits to the PJM region than all the other officially submitted projects from the 2014/2015 Long-Term Window;
  - PJM has been fully transparent with stakeholders throughout the 2014/2015 Long-Term Window and subsequent re-evaluations of Project 9A;
  - Multiple re-evaluations of Project 9A continue to demonstrate that Project 9A
    passes the benefit/cost ratio of 1.25 and provides significant benefits as detailed
    below; and
  - Without the inclusion of Project 9A into the PJM RTEP, the PJM region would incur increased costs and additional transmission upgrades would be necessary to ensure the reliability of the PJM region.

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- 17 Q. Do you have any corrections to Mr. McGlynn's Direct Testimony?
- 18 A. No.
- Q. Do you make any changes to Mr. McGlynn's recommendation in his Direct
  Testimony?
- 22 A. No.

1	Q.	Are you sponsoring any exhibits with your Rebuttal Testimony?
2	A.	Yes. They are listed below.
3		• TPA Exhibit No. TH-1R: TEAC Recommendations to the PJM Board (October 2015)
4 5		<ul> <li>TPA Exhibit No. TH-2R: PJM 2014/2015 Long Term Proposal Window Independent Cost Review White Paper</li> </ul>
6 7		• TPA Exhibit No. TH-3R: TEAC Recommendations to the PJM Board, PJM Staff Whitepaper (August 2016)
8 9		• TPA Exhibit No. TH-4R: Transmission Expansion Advisory Committee Market Efficiency Update (October 25, 2016)
10 11		• TPA Exhibit No. TH-5R: PJM White Paper, Transource Independent Energy Connection Market Efficiency Project (November 15, 2018)
12 13		• TPA Exhibit No. TH-6R: PJM Manual 19: Load Forecasting and Analysis (October 25, 2018)
14		• TPA Exhibit No. TH-7R: PJM's Support for Variable Resources
15		• TPA Exhibit No. TH-8R: PJM, The Value of Markets
16		• TPA Exhibit No. TH-9R: the Company's response to data request OCA XIII-01
17 18		• TPA Exhibit No. TH-10R: Transmission Expansion Advisory Committee Market Efficiency Update (March 10, 2016)
19 20		• TPA Exhibit No. TH-11R: Transmission Expansion Advisory Committee Market Efficiency Update (April 7, 2016)
21		• TPA Exhibit No. TH-12R: PROMOD tool details
22		
23	Q.	What was your role in the evaluation of the Project?
24	A.	Throughout the period of the project evaluation and recommendation I was Manager of
25		the Market Simulation department at PJM. This role involved managing the Market
26		Efficiency group where I was responsible for overseeing Market Efficiency analysis,

including stakeholder engagements, review of market efficiency project submissions, the

1		benefit/cost evaluation, and recommendations. PJM was not the developer for Project 9A
2		but rather facilitated the evaluation and recommendation process.
3		
4	Q.	Before you begin, please summarize your Rebuttal Testimony.
5	A.	In this Testimony I will provide details related to PJM's selection of Project 9A pursuant
6		to the PJM planning process. I will also show that, contrary to positions taken by various
7		intervenors, after conducting multiple re-evaluations, the project continues to offer
8		considerable economic and reliability benefits and is essential to achieving a non-
9		discriminatory, open access transmission system within PJM.
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11	Q.	How is your Testimony organized?
	<b>Q.</b> A.	How is your Testimony organized?  My Testimony is organized into the following sections:
11		
11 12		My Testimony is organized into the following sections:
<ul><li>11</li><li>12</li><li>13</li></ul>		My Testimony is organized into the following sections:  • In Section I, I explain why PJM selected Project 9A to address transmission
11 12 13 14		My Testimony is organized into the following sections:  • In Section I, I explain why PJM selected Project 9A to address transmission congestion across the Pennsylvania and Maryland border, and describe the
11 12 13 14 15		<ul> <li>My Testimony is organized into the following sections:</li> <li>In Section I, I explain why PJM selected Project 9A to address transmission congestion across the Pennsylvania and Maryland border, and describe the process that PJM undertook in evaluating all the proposed solutions;</li> </ul>
11 12 13 14 15		<ul> <li>My Testimony is organized into the following sections:</li> <li>In Section I, I explain why PJM selected Project 9A to address transmission congestion across the Pennsylvania and Maryland border, and describe the process that PJM undertook in evaluating all the proposed solutions;</li> <li>In Section II, I explain why Project 9A is needed to address transmission</li> </ul>

events;

to Project 9A;

• In Section IV, I explain why PJM did not select various transmission alternatives

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In Section V, I provide an overview of PROMOD software and describe how it is
used widely in the industry.

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#### I. SELECTION OF PROJECT 9A

Q. OCA disputes PJM's selection of Project 9A and argue that PJM should have selected other alternatives. (OCA St. No. 2, p. 4.) Did PJM evaluate other alternatives to Project 9A, if so how many?

Yes, PJM evaluated multiple alternatives to Project 9A. PJM opened a Long-Term RTEP Window beginning October 30, 2014 through February 27, 2015 ("2014/2015 Long-Term Window"), to solicit proposals to alleviate the AP-South interface congestion identified in long-term simulation results along with additional congestion drivers. PJM is required to recommend transmission system enhancements which will provide benefits that exceed costs by at least 25%. These benefits may include reductions in production costs, load payments, and congestion as a result of the recommended project. Project proposals submitted during this 2014/2015 Long-Term Window included system enhancements that would relieve congestion constraints for which no reliability-based RTEP project was already identified. PJM received 41 market efficiency project proposals, including Project 9A, designed to alleviate AP-South congestion. After extensive evaluation and stakeholder review, PJM selected and recommended Project 9A as approved by the PJM Board in August 2016. These evaluations are further described in this testimony along with the 2018 Whitepaper.

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#### Q. Please explain the process that PJM undertook in evaluating the proposed solutions.

In October of 2014, PJM opened the 2014/2015 Long-Term Window to solicit proposals
to address future simulated congestion. There were ninety-three proposals submitted
during the 2014/2015 Long-Term Window. Projects submitted ranged in costs from \$0.1
million to \$432 million. Proposals included both Transmission Owner upgrades and
greenfield projects from both incumbent transmission owners and non-incumbent entities.

PJM evaluated all of these proposals in accordance with the competitive planning process that is set forth in PJM Manual 14F by comparing market efficiency simulation results with and without each project proposal over a 15-year planning horizon. The results of the analysis were used to calculate a benefit/cost ratio for each project proposal. In 2015, the PJM Board approved 11 Market Efficiency projects for inclusion into the 2015 RTEP. These projects consisted of upgrades to existing equipment and were designated to the incumbent transmission owners. Figure 1 below shows the location of the approved projects, many of which are physically located in Pennsylvania. The expected reduction of congestion associated with all these 11 projects is approximately \$815 million over a 15-year period as described in the PJM Staff Whitepaper prepared for the PJM Board in October of 2015 located at the below link on the TEAC webpage, which is provided as TPA Exhibit No. TH-1R.

[https://www.pjm.com/-/media/committees-groups/committees/teac/20151008/20151008-

pjm-teac-board-whitepaper.ashx}

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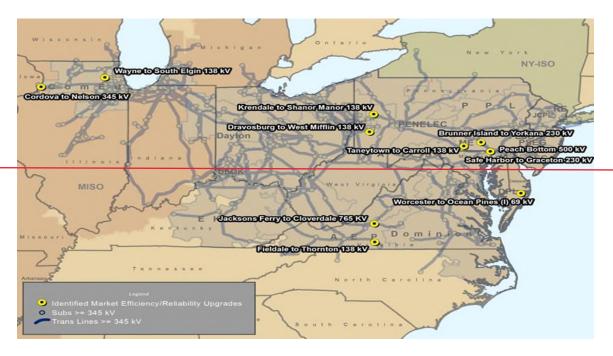


Figure 1. Location of the 2015 Market Efficiency approved projects

Additionally, at the February 2016 Board meeting, the PJM board approved two projects. The first project addressed congestion associated with PJM Interconnected Reliability Operating Limit ("IROL") reactive interfaces, and the second project addressed increased capacity costs from restricted Capacity Emergency Transfer Limits ("CETL") encountered in PJM's Reliability Pricing Model ("RPM") auctions for the COMED Locational Deliverability Area ("LDA"). These projects are shown in Figures 2 and 3.

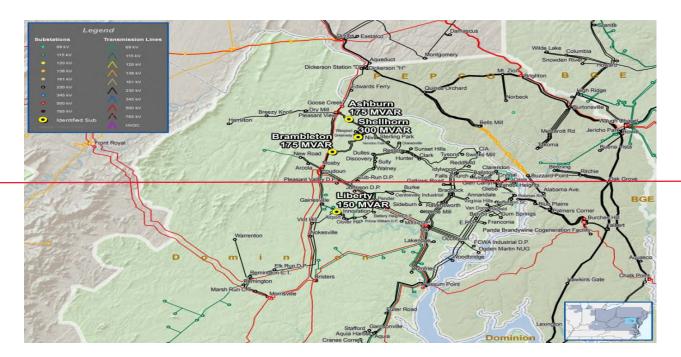


Figure 2: Map of February 2016 Board Approved Optimal Capacitors Project (B2729)

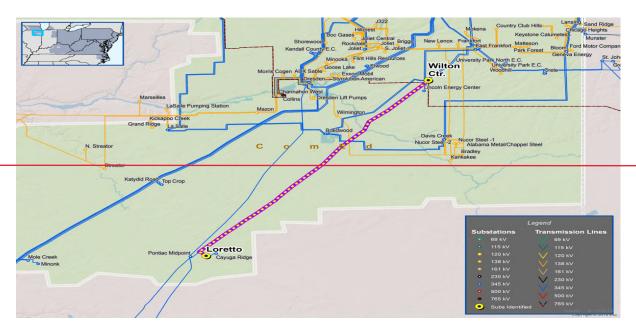


Figure 3: Map of February 2016 Board Approved RPM Project (B2728)

- Following the February 2016 Board meeting, PJM staff continued to assess the
- 4 group of projects submitted to address congestion associated with the PJM IROL AP-

South interface. The analysis was extensive and involved several steps as displayed in the timeline shown in Figure 4 below. Of the 41 projects proposed to address this congestion, 4 projects were ultimately competitive. In total, approximately 23,000 hours of computation time was necessary to run all the AP-South interface analysis.

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#### **Market Efficiency ApSouth Analysis Timeline**

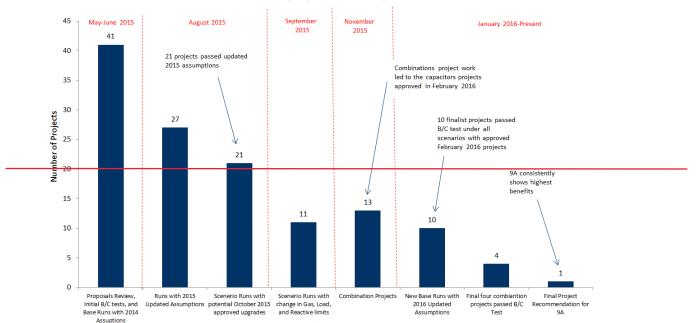


Figure 4: Market Efficiency Timeline for ApSouth Analysis

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The final four projects that PJM considered competitive because they satisfied the required benefit/cost threshold of 1.25 and provided significant reduction to the congestion on the AP-South interface were described in the direct testimony of Mr. McGlynn. Ultimately, the project that provided the most benefits was Project 9A. This project involved a western and an eastern set of transmission facilities. The combination of both western and eastern transmission provides significant benefits because it allows energy to divert from the regional high voltage system to lower voltage load areas.

Although Project 9A provided the most congestion benefits and highest benefit/cost ratio,

PJM performed additional studies of combinations of different projects because of the similarity of projects in the Southwestern Pennsylvania area.

The analysis of the different combination of projects solidified PJM's staff's confidence in recommending Project 9A. This analysis included different scenario analysis using various assumptions to ensure the recommended project was robust. The scenario analysis included variations in load forecast, fuel prices, and generator assumptions. Many of these scenarios resulted from PJM stakeholder recommendations. The results of the various scenario analyses were provided in the direct testimony of Mr. McGlynn, which I am adopting as explained above. These results show that Project 9A provides the most benefits for the different scenarios. PJM also incrementally evaluated the four finalist projects with the inclusion of Project 9A. The result was that with the inclusion of Project 9A the remaining finalist projects no longer passed the benefit/cost threshold test of 1.25. Finally, PJM evaluated the recommended Project 9A using assumptions for the Clean Power Plant and forecasted fuel prices. The result was that the benefit/cost ratio for Project 9A was equal to 4.67.

In addition, PJM developed a whitepaper at the below link and provided as TPA Exhibit No. TH-2R that summarizes the independent cost, schedule and constructability analyses completed for the evaluation of some of the Market Efficiency projects that were proposed in the window. The results of this analysis confirmed the need of Project 9A.

[http://www.pjm.com/~/media/committees-groups/committees/teac/20160512/20160512-2014-2015-long-term-proposal-window-independent-cost-review-white-paper.ashx]

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Multiple market efficiency and reliability re-evaluations were performed subsequent to the 2014/2015 market efficiency cycle that re-affirmed the benefits and need of Project 9A. These evaluations are further described in this testimony and the 2018 Whitepaper.

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#### **Did PJM receive input from stakeholders during the selection process?**

Yes: The results of the analyses completed pursuant to the selection process were reviewed with the TEAC and Subregional RTEP Committees over several meetings throughout 2016. The then most recent analyses, along with recommended solutions, were reviewed during a June 23, 2016 TEAC webcast. Written comments were requested to be submitted to PJM communicating any concerns with the recommendation and any alternative transmission solutions for consideration. TPA Exhibit No. TH-3R. See also: [https://www.pjm.com/-/media/committees-groups/committees/teac/20160811/20160811-board-whitepaper-august-2016.ashx]. PJM also presented a market efficiency update to the TEAC which included a proposal analysis overview. TPA Exhibit No. TH-4R. See also: [https://pjm.com/-/media/committees-groups/committees/teac/20161025/20161025-market-efficiency-update.ashx]. Additionally, in response to stakeholder recommendations, PJM conducted different scenario analysis using various assumptions to ensure Project 9A was robust. The scenario analysis included variations in load forecast and fuel price assumptions.

#### II. NEED FOR PROJECT 9A

- 2 Q. The OCA argues that Project 9A is not needed. (OCA St. No. 2, p. 22.) Has PJM updated its evaluation of Project 9A?
- 4 A. Yes. PJM has recently published the 2018 Whitepaper, on November 15, 2018, available at: [https://www.pjm.com/-/media/committees-
- groups/committees/teac/20181108/20181108-transource-white-paper.ashx] and provided
   as TPA Exhibit No. TH-5R.

Table 1: Transource IEC Benefit/Cost Ratio Evaluation History

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IEC Evaluation	Benefit / Cost Ratio	Benefit (\$M)	Cost (\$M) Revenue Requirement	Nominal Project Cost (\$M)
Original August 11, 2016 – Board Presentation	2.48	\$1,188.00	\$478.15	\$340.60
Re-Evaluation No. 1 September 14, 2017 – TEAC Presentation	1.30	\$600.73	\$462.87	\$340.60
Re-Evaluation No. 2 February 8, 2018 – TEAC Presentation	1.32	\$611.48	\$462.87	\$340.60
Re-Evaluation No. 3 September 13, 2018 – TEAC Presentation	1.42	\$707.29	\$497.62	\$366.17
Ratio Update October 16, 2018	1.40	\$707.29	\$505.85	\$372.20
		Present value of load payment benefit (for zones where payments	Present value of the 15-year annual revenue requirement for IEC project	

Additionally, since 2016, PJM has evaluated the need for Project 9A four times, the most recent in September 2018. All four evaluations – the original justification and three subsequent re-evaluations, shown in Table 1 confirmed the project provided significant economic benefits and passed the required 1.25 benefit/cost threshold. The re-

decreased)

evaluations have continued to reaffirm the PJM Board's August 2016 approval of Project 9A. These evaluations are further described in the 2018 Whitepaper.

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#### Q. Please explain what PJM determined in its updated restudy.

Project 9A was originally justified on the basis of market efficiency to mitigate congestion. The latest benefit/cost ratio re-evaluation presented at the September 13, 2018 TEAC meeting reaffirmed that economic need. The study re-evaluated Project 9A under an updated project cost estimate of \$366.17 million and simulation input parameters. That study found a benefit/cost ratio equal of 1.42 and estimated congestion savings of more than \$860 million over 15 years. PJM determined that Project 9A is still necessary and still meets the benefit/cost ratio. After an updated cost estimate of \$372.2 million in October, the revised and current benefit/cost ratio is 1.40. In addition, Project 9A is estimated to save \$866.2 million in congestion costs over 15 years and while reliability and resilience are not drivers of Project 9A, reliability criteria violations would result if Project 9A is not constructed. This is important because if Project 9A would not be built, overloads on the PJM system would occur. These overloads would have to be addressed through PJM baseline system enhancements. Descriptions of these overloads and a summary of the reliability benefits and impacts are provided in the testimony of Mr. Herling and in the 2018 Whitepaper. Also, it is not particularly surprising and history has shown that RTEP projects justified on the basis of reliability have also shown economic benefit by mitigating congestion.

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- 1 Q. OCA witness Lanzalotta argues that PJM summer peak load levels have been
- decreasing, which demonstrates that Project 9A is no longer necessary. (OCA St.
- No. 2, p. 16-18.) Is Mr. Lanzalotta's analysis correct?
- 4 A. No. PJM's market efficiency analysis is not dependent on one peak hour load of one year.
- 5 The market efficiency analysis looks at all 8,760 hours of a year across a 15-year
- forward-looking horizon. However, PJM did perform a sensitivity analysis and updated
- analysis, as demonstrated in this testimony and the 2018 Whitepaper using various
- 8 variations in input assumptions, including load forecast. PJM's load forecast incorporates
- 9 equipment indices that reflect trends in energy efficiency (state-approved and other), as
- described in PJM Manual 19, Load Forecasting and Analysis, Section 3. See
- 11 [https://www.pjm.com/~/media/documents/manuals/m19.ashx], which is provided as
- 12 TPA Exhibit No. TH-6R. Given that all energy efficiency is accounted for, no additional
- adjustment to the load forecast is needed for PJM's system planning studies. Levels of
- energy efficiency, demand response, wind resources, solar resources, and other
- distributed energy resources are assumptions incorporated into PJM's RTEP at the start
- of the RTEP process cycle pursuant to PJM's Operating Agreement, Schedule 6, 1.5.3.
- More information can be found regarding PJM's support for variable resources through
- the following link: [https://www.pjm.com/-/media/about-pjm/newsroom/fact-
- 19 <u>sheets/support-variable-resources.ashx?la=en]</u> and is provided in TPA Exhibit No. TH-
- 7R. This sensitivity analysis showed Project 9A continued to pass the required
- benefit/cost ratio threshold.

- Q. Mr. Lanzalotta also cites a September 2015 U.S. Department of Energy Study regarding electric transmission congestion as support for his conclusion that Project 9A is not necessary. (OCA St. No. 2, p. 18.) Please respond.
- A. This study is not relevant to the need for Project 9A. This report is not specific to PJM or the AP South interface and does not suggest that there is no congestion anywhere. PJM's market efficiency analysis including that driving the need for Project 9A is based on 15-year forward-looking planning horizon, not historical data. PJM's market efficiency analysis continues to demonstrate that Project 9A is needed.

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- Q. Several parties in this proceeding have argued that Project 9A provides limited benefits to Pennsylvania and therefore should be denied. Do you agree?
  - No, Project 9A provides multiple benefits as described below. These benefits impact both the PJM region and Pennsylvania. Moreover, a Pennsylvania-only focus for a specific project, such as Project 9A, is fundamentally inconsistent with the way in which the PJM transmission system has been planned and operated for many years. It is also inconsistent with PJM's regional and market based planning approach that has provided many benefits to the PJM region and to Pennsylvania specifically:
    - Project 9A was approved by the PJM Board in 2016 as the more efficient, cost-effective project to address persistent congestion identified in forward-looking economic studies on the AP-South Interface. And, while not needed to address reliability criteria violations at that time, PJM noted that the project would inherently enhance system reliability by introducing additional transmission network paths. In parallel with the September 2018 benefit/cost ratio re-

evaluation, PJM assessed the extent to which Project 9A provides identifiable
reliability benefits. Power flow results have confirmed that Project 9A does
indeed solve identified overloads and absent Project 9A, baseline system
enhancements would be required to address these multiple overloads.
Descriptions of these overloads and a summary of the reliability benefits and
impacts are provided in the rebuttal testimony of Mr. Herling and in the 2018
Whitepaper;

- PJM's grid has electricity reserve margins that ensures PJM can maintain reliability (i.e. keep the lights on) under extreme conditions. Project 9A ensures the grid maintains an adequate level of reserves by providing access to new efficient generation resources in PJM and Pennsylvania that are currently restricted to certain areas of the network because of transmission limitations;
- without Project 9A, and absent other major infrastructure improvements, dispatchers would, in the near term, have to re-dispatch power generators around the trouble spots to avoid the overloads. This re-dispatch of generation would likely cause additional transmission system congestion and higher costs to consumers in areas of Maryland and Pennsylvania. Completing Project 9A would address the forecast reliability issues in Pennsylvania and Maryland and the accompanying congestion they could cause;
- Reduction to system level production costs, which is the outcome of Project 9A,
   results in overall lower costs to both the PJM region and Pennsylvania customers;
- The area served by PJM accounts for 21 percent of the U.S. Gross Domestic
   Product. Thus affordable wholesale electricity prices have an outsized impact on

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the economic productivity of our region and the nation. States such as Pennsylvania that have elected to rely on market forces to stimulate the entry and exit of generators have cultivated some of the most attractive environments for new resource development and investment in the U.S. For example, the top three states in PJM with generation projects under consideration are Ohio (20,000+ MW), Pennsylvania (18,000+ MW) and the PJM portion of northern Illinois (15,000+ MW). This is no accident. Policies have enabled these states to nurture a vibrant market for generator development that attracts billions of dollars of private investment – more than \$17 billion in Ohio and Pennsylvania alone. These investments in new generation are further incented with the construction of the Transource project;

- New technologies tend to improve efficiency, and PJM's current generation mix is 30 percent less carbon-intensive than 10 years ago. On average, producing one megawatt of power in PJM emits 13 percent less carbon dioxide than it did 10 years ago. Emissions reductions are largely the result of the competitive markets encouraging the free entry of new, competing technologies. Removal of transmission bottlenecks with transmission upgrades, such as that of Project 9A provides access to more of this technology; and
- Project 9A provides Marcellus shale natural gas powered generation access to a
  broad range of markets over the transmission system. Pennsylvania has an
  abundance of Marcellus shale natural gas which is being used to generate
  electricity. A regional transmission grid provides an outlet for this generation,
  benefitting Pennsylvania Marcellus shale producers and generators.

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1	Additional information regarding the value of PJM markets generally can be found at:
2	[https://www.pjm.com/-/media/about-pjm/newsroom/fact-sheets/the-value-of-pjm-
3	markets.ashx?la=en], which is provided as TPA Exhibit No. TH-8R.

In summary, Pennsylvania customers benefit, and have benefitted for many years, through the regional planning operations of PJM, and such benefits will continue with the construction of Project 9A. It is not appropriate or reasonable to view transmission project benefits on a single state, stand-alone basis. The states within the PJM interconnection are highly integrated operationally, and infrastructure planning must recognize that integration.

#### **III. AP SOUTH CONGESTION**

- Q. OCA Witness Crandall argues that AP South constraints do not cause higher costs all of the time. (OCA St. No. 3, p. 9.). Is this a relevant analysis?
- A. No. I agree that the AP South constraint does not occur all the time. PJM has never indicated that the constraints happen all of the time. However, during the hours that AP South is constrained, PJM dispatches generation out of economic merit order to control power flow, incurring congestion costs, presumably the "higher costs" to which he refers.

  See OCA St. No. 3, p. 9.

- Q. Mr. Crandall also argues that AP South congestion costs and events have decreased
   since 2015. Please respond.
- A. This is not a relevant analysis. While PJM reviews historic congestion, the cost/benefit analysis is based on a forward-looking case over a 15-year period. This 15-year forecast

1	continues to demonstrate that Project 9A is necessary and cost-justified. In addition,
2	Project 9A will not only alleviate congestion at the AP South interface but also at other
3	congested areas on the PJM grid.

- OCA witness Lanzalotta further states that AP South congestion costs have been volatile. (OCA St. No. 2, p. 17.) Does the fact that congestion costs at the AP South interface vary from year to year eliminate the need for Project 9A?
- A. No. The fact that AP South congestion costs have been volatile according to Mr.

  Lanzalotta is not relevant. Congestion costs may be volatile for any number of reasons.

  The relevant analysis is the PJM Tariff required benefit/cost analysis for the future period under study.

- Q. Mr. Crandall also argues that PJM did not identify when congestion occurs on the AP South interface. (OCA St. No. 3, p. 14.) Do you agree?
- A. PJM's written response to OCA's question about when congestion occurs in the AP South interface is provided as TPA Exhibit No. TH-9R. In that response, PJM noted that the market efficiency analysis is based on all of the 8,760 hours in a year. In addition, to answer OCA's question, even though it is not relevant, PJM provided OCA with an Attachment to the discovery response providing an hourly accounting of times when the AP South Reactive interface was an active binding constraint in day-ahead and real time PJM markets during the period January 1, 2014 to May 12, 2018. This was over four years of hourly data. Therefore, I disagree with Mr. Crandall's statement that PJM did not provide a useful characterization of when congestion events are likely to occur.

Moreover, PJM cannot uniquely identify when generation is moved to control just AP South congestion. Generation operated out of economic merit order may address more than just AP South congestion. The provisions model used by PJM to address congestion issues is much more complex than assumed by Mr. Crandall.

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#### IV. TRANSMISSION ALTERNATIVES TO PROJECT 9A

OCA Witness Lanzalotta argues that PJM should consider several transmission alternatives to Project 9A. (OCA St. No. 2, pp. 21-22.) One of these transmission alternatives was the MAIT proposal 18 H. Why did PJM not select proposal 18 H? The results of the alternatives to Project 9A were presented in several TEAC updates, including the March 10, 2016 TEAC Update, which is available at [https://pjm.com/-/media/committees-groups/committees/teac/20160310/20160310-market-efficiencyupdate.ashx] and provided as TPA Exhibit No. TH-10R, and the April 7, 2016 TEAC Update, which is available at [https://pjm.com/-/media/committeesgroups/committees/teac/20160407/20160407-teac-market-efficiency-update.ashx] and provided as TPA Exhibit No. TH-11R. Page 17 of the March 2016 TEAC update shows that Project 18H would only reduce total PJM congestion by \$14 million for the 2019 and 2022 study years. Project 9A would reduce total PJM congestion by \$83 million over the same period. See Page 5 of the April 2016 TEAC Update. The differences in the reduction in congestion costs between the two projects are quite substantial over the study years and are considerably greater over a 15-year evaluation period.

1	Q.	Mr. Lanzalotta also states that PJM should have selected a combination of proposal		
2		18H and Transource East. (OCA St. No. 2, p. 21.) Why didn't PJM select this		
3		alternative?		
4	A.	PJM performed multiple studies of combining portions of different projects that could		
5		practically be done. These combinations were presented at the March 10, 2016 TEAC		

practically be done. These combinations were presented at the March 10, 2016 TEAC meeting. TPA Exhibit No. TH-10R. In particular, the analysis of the combination of the 18H and Transource East (i.e. 9A East) resulted in less benefits then the full Project 9A (9A East plus 9A West). In particular, and as demonstrated in the graphs provided in the Direct Testimony of Mr. McGlynn, the full Project 9A which included the East and West components provided higher benefits than the combination of the 18H plus Transource East. Additionally, the combination of the 18H plus Transource East project resulted in additional congestion in the BGE control area that would needed to be addressed if that project would have been recommended.

#### V. PROMOD

- Q. Witness Shaw challenges PJM's use of the PROMOD model. (Shaw St. No. 1, p.
   16.) What is the PROMOD model?
- A. PROMOD is a fundamental electric market simulation tool that incorporates extensive details in generating unit operating characteristics, transmission grid topology and constraints, and market system operations to support economic transmission planning.

  Details of this tool are provided at the following link and in TPA Exhibit No. 12-R:
- $\underline{\text{[$https://new.abb.com/enterprise-software/energy-portfolio-management/market-$}}\\$
- 23 analysis/promod].

#### 1 Q. Is the PROMOD model used widely in the industry?

- 2 A. Yes, PROMOD is used by PJM and other regions such as Midwest Independent System
- Operator ("MISO"), Electric Reliability Council of Texas ("ERCOT"), and Southwest
- 4 Power Pool ("SPP"). PROMOD is also used by many stakeholders and by a large variety
- of consulting companies in the electric power industry.

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- 7 Q. Mr. Shaw argues that PJM should not rely on the PROMOD model but should use
- 8 probabilistic weighting. (Shaw St. No. 1, p. 17.) Please respond.
- 9 A. PJM did conduct multiple sensitivities as demonstrated in multiple graphs provided in the
- direct testimony of Mr. McGlynn. These sensitivities further affirmed the
- recommendation of Project 9A. In addition, the method Shaw describes has not been
- approved by stakeholders and by FERC, and therefore cannot be relied upon by PJM.
- Finally, PJM used the ABB gas forecast that is based on fundamentals which take into
- 14 account multiple expected values of gas forecasts that ABB blended together. This
- ensures the gas prices used in the PROMOD simulations are not dependant on a single
- 16 forecast.

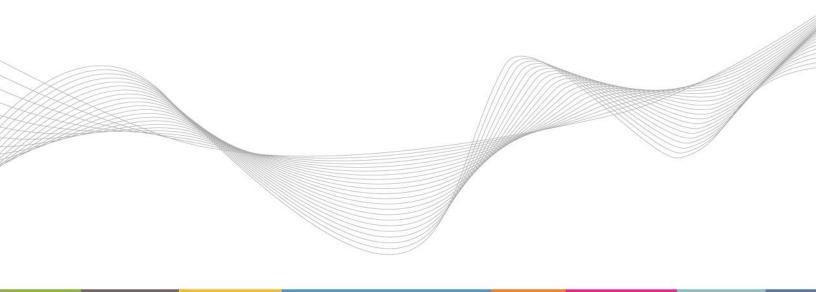
- 18 Q. Does this conclude your Rebuttal Testimony at this time?
- 19 A. Yes.



### PJM White Paper

## **Transource Independence Energy Connection Market Efficiency Project**

PJM Interconnection November 15, 2018







Transource Independence Energy Connection Market Efficiency Project

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#### **Highlights**

- PJM Interconnection's latest re-evaluation of the Transource Independence Energy Connection project (Transource project) shows that it continues to offer economic benefits in the region and resolves burgeoning reliability issues.
- The Transource project will enhance competition by allowing power from low-cost generators to flow to consumers in areas of eastern PJM.
- The benefit/cost ratio of the most recent re-evaluation excluding the reliability benefits is 1.40, exceeding the 1.25 ratio necessary to remain in the PJM Regional Transmission Expansion Plan (RTEP).
- Without the Transource project, PJM has identified reliability violations on five major transmission facilities
  on the regional bulk power system as early as 2023. PJM would have to quickly implement solutions to
  these potentially costly issues to maintain reliability. This equates to direct reliability benefits to consumers
  in Pennsylvania and Maryland.
  - The 500 kV Peach Bottom to Conastone line is forecast to overload, as would a 500 kV/230 kV transformer at Three Mile Island.
  - Three 115 kV transmission lines in Adams County, Pa., are forecast to overload.
- The Transource project will also increase the maximum megawatts that can be imported under peak
  conditions into the Baltimore Gas and Electric Co. (BGE) Load Deliverability Area (LDA). This increase in
  the Capacity Emergency Transfer Limit (CETL) will result in benefits to the regional capacity market in 2023.

#### **Executive Summary**

PJM Interconnection solicits and authorizes transmission expansion projects for a variety of purposes: To ensure the reliability of the regional high-voltage transmission system so enough electricity is available for consumers, and to minimize the risk of disruptions. PJM also seeks to improve the efficiency of the high-voltage transmission system to enhance competition. Market efficiency projects increase the ability of low-cost generators to supply electricity to the market by relieving constraints in the transmission system and allowing power to flow to consumers across the region. Under Order No. 2000, the Federal Energy Regulatory Commission (FERC) established the framework for regional transmission organizations in the United States. A goal of Order No. 2000 was to promote efficiency in wholesale electricity markets and ensure that electricity consumers pay the lowest price possible for reliable service. FERC said that competition in the wholesale markets is the best way to protect the public interest and achieve the lowest-cost reliable service. The Transource Independence Energy Connection project (IEC), is a market efficiency project that would establish two new 230 kV transmission lines across the Pennsylvania-Maryland border. It would allow low-cost power to flow into areas of eastern PJM, especially parts of Maryland and Northern Virginia and into the District of Columbia, relieving longstanding transmission system bottlenecks that, without relief, are forecast to continue into the future. Each year PJM staff analyzes the economic value of approved market efficiency projects.



The re-evaluation of the Transource project in September 2018 and a ratio update in October 2018, continued to find that it would provide benefits that extend across a wide area, including areas of Pennsylvania and Maryland.

#### I. Introduction

Transmission congestion arises when least-cost energy cannot be delivered to the consumer because of physical limitations to the electric transmission system. Indeed, recent history drives home the economic impact of congestion. Congestion across the four 500 kV transmission lines comprising the AP-South Interface along the Pennsylvania-Maryland border has imposed economic transmission constraint costs totaling approximately \$800 million from 2012 through 2016<sup>1</sup>. These costs are ultimately borne by residents, commercial businesses and industrial customers in eastern PJM.

PJM's forward-looking studies have also identified persistent congestion on the AP-South Interface over a 15-year planning horizon. Those studies drove PJM's request during a 2014/2015 window for solicitation of technical solutions to alleviate the identified persistent congestion. Based on subsequent evaluation of the proposals received, PJM recommended the Transource project<sup>2</sup> – shown on **Map 1** – to alleviate AP-South congestion allowing lowercost energy to be delivered efficiently and reliably to consumers.

The Transource project – also known as Project 9A – is expected to provide economic benefits at least 25 percent higher than the cost of the project. PJM uses this 1.25 benefit/cost threshold criterion in its FERC-approved planning process to evaluate market efficiency proposals for potential recommendation to the PJM Board of Managers (Board). With the Board's approval, recommendations become part of the Regional Transmission Expansion Plan (RTEP).

Since 2016, PJM has evaluated the need for the Transource recommended project four times, the most recent in September 2018. All four evaluations – the original justification and three subsequent re-evaluations, shown in **Table 1** – confirmed the project provided significant economic benefits and passed the required 1.25 benefit/cost threshold. The re-evaluations have continued to reaffirm the PJM Board's August 2016 approval of the Transource project.

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<sup>&</sup>lt;sup>1</sup> Data drawn from State of the Market Reports published by PJM's market monitoring unit, Monitoring Analytics.

<sup>&</sup>lt;sup>2</sup> The Transource project was originally designated Project 9A within the context of PJM's RTEP process and has appeared in PJM documentation labelled as such.



#### Map 1 IEC Project – AP-South Interface Congestion Solution

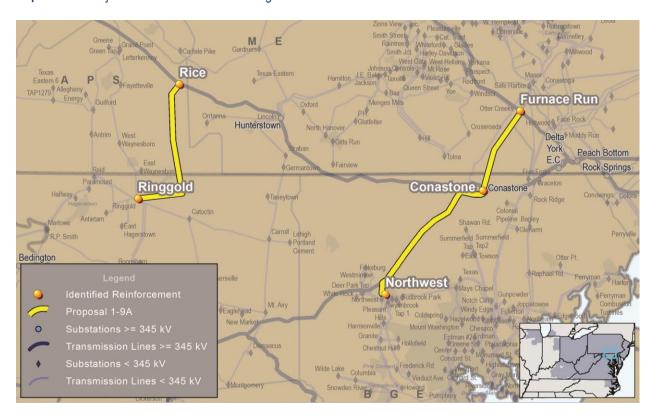


Table 1 IEC Benefit/Cost Ratio Evaluation History

IEC Evaluation	Benefit / Cost Ratio	Benefit (\$M)	Cost (\$M) Revenue Requirement	Nominal Project Cost (\$M)
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#### **Reliability Benefits**

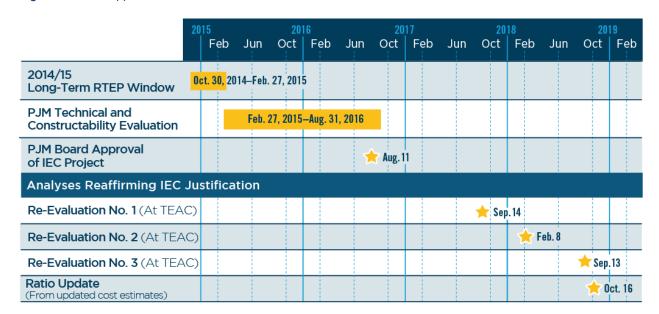
The Transource project was approved by the PJM Board in 2016 as the more efficient, cost effective project to address persistent congestion identified in forward looking economic studies on the AP South Interface. While not needed to address reliability criteria violations at that time, PJM noted that the project would inherently enhance system reliability by introducing additional transmission network paths. In parallel with the September 2018 benefit/cost ratio re evaluation, PJM assessed the extent to which the Transource project provides identifiable reliability benefits. Power flow results have confirmed that the Transource project does indeed solve identified 2023 everloads on a 500 kV line, a 500/230 kV transformer and other transmission facilities.

#### II. Third Re-Evaluation Reaffirms Transource Project

PJM recommended the Transource project from among 41 developer proposals formally submitted as part of a solicitation window from Oct. 30, 2014 through Feb. 27, 2015. Initial evaluation of the Transource project proposal yielded a benefit/cost ratio of 2.48. Given that the ratio exceeded PJM's Tariff-specified 1.25 threshold for market efficiency projects, the result justified the Transource project approved by the PJM Board in August 2016, as shown in the timeline in **Figure 1**.

Based on established RTEP planning practice – consistent with the PJM Operating Agreement (OA) – PJM conducted subsequent re-evaluations, also shown in the **Figure 1** timeline. PJM conducted studies in September 2017 and February 2018 to re-evaluate the Transource project under updated project cost and simulation input parameters. Those re-evaluations yielded benefit/cost ratios of 1.30 and 1.32, respectively, as summarized earlier in **Table 1**. As **Table 1** also shows, PJM has completed a third September 2018 re-evaluation reaffirming project justification with a benefit/cost ratio equal to 1.42, decreasing slightly to 1.40 in October 2018 with updated cost estimates from Transource for its portions of the project. The project also addresses emerging reliability issues and, as mentioned later, provides capacity market benefits in the BGE LDA.

Figure 1 IEC Approval Timeline





#### Benefit/Cost Ratio Reaffirms Need

PJM updated its production cost simulation models again in September 2018 to reflect the most recently updated input parameter information: AP-South reactive interface limits, transmission topology, interchange with adjoining systems, natural gas and other fuel price forecasts, emissions forecasts and interconnection generator statuses. The updated analysis yielded a net load payment benefit of \$707.29 million.

From a project cost perspective, the September 2018 re-evaluation included a project cost estimate of \$366.2 million, reflecting a \$26 million increase over the \$340.6 million project estimate used in the May 2016, September 2017 and February 2018 evaluations. The largest cost-estimate changes were due to the following increases: \$6 million for the Furnace Run tie-in, \$11.2 million for the Rice tie-in and \$7.4 million to reconductor and rebuild the Conastone-Northwest 230 kV transmission line.

These updated benefit and cost values yielded a benefit/cost ratio of 1.42, reaffirming again the Board's approval of the Transource project. PJM also notes that congestion savings are estimated at over \$860 million over 15 years, providing additional economic benefit.

In October 2018, PJM received updated cost estimates from Transource for its portions of the project, which increased the total estimated project cost from \$366.2 million to \$372.2 million. A project cost breakdown as of October 2018 is provided in APPENDIX A1. That cost increase had the effect of reducing the benefit/cost ratio slightly from 1.42 to 1.40.

#### III. Reliability Benefits

In parallel with the September 2018 benefit/cost ratio re-evaluation, PJM also assessed the extent to which the Transcuree project provides concrete, identifiable reliability benefits. Power flow results have confirmed that the Transcuree project does indeed do so. System changes arising since 2016—including topology additions and generator deactivations—are contributing to reliability criteria violations identified in the 2023 study year power flow analysis.<sup>3</sup> Absent the Transcuree project, baseline system enhancements would be required to address the following overloads shown on **Map 2**:

- TMI 500/230 kV transformer
- Peach Bettom Conastone 500 kV line
- Hunterstown Lincoln 115 kV line
- Lincoln Tap Lincoln 115 kV line
- Lincoln Straban 115 kV line

<sup>&</sup>lt;sup>3</sup> More specifically, the analysis identified multiple reliability criteria violations under a combination of summer and winter generation deliverability tests.



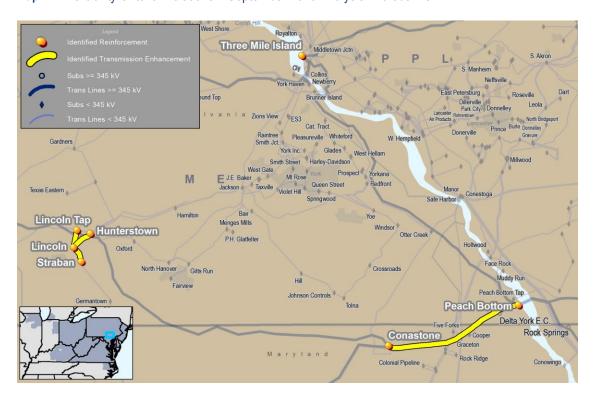
The Peach Bettem Conastone 500 kV overload, in particular, draws attention. A solution and estimated cost for a violation of this scope are typically non trivial. It highlights to an even greater degree the reliability benefit of implementing the Transource project.

Overloading electric transmission equipment, much like connecting too many appliances to a home extension cord, can cause the equipment to heat up beyond its limits and fail. This can result in damage to the system and widespread power outages. Without the Transource project, and absent other major infrastructure improvements, dispatchers would, in the near term, have to re dispatch power generators around the trouble spots to avoid the overloads. This re dispatch of generation would likely cause additional transmission system congestion and higher costs to consumers in areas of Maryland and Pennsylvania. Completing the Transource project would address the forecast reliability issues in Pennsylvania and Maryland and the accompanying congestion they could cause.

#### **CETL Improvement Provides RPM Benefit**

PJM notes that reliability studies also revealed that the addition of the Transcurse project increased the Capacity Emergency Transfer Limit (CETL<sup>4</sup>) for the BGE LDA, yielding Reliability Pricing Model (RPM) capacity market benefits in 2023. Access to lower priced capacity resources outside the BGE LDA is likely to result in lower capacity prices inside the BGE area.

Map 2 Reliability Criteria Violations September 2018 Analysis Without IEC



<sup>4</sup> A CETL value represents the maximum megawatts that an LDA can import under specified peak load test conditions. Transmission system topology changes, load forecasts, generation additions and generation deactivations can all impact CETL values.

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#### IV. Background – Initial Evaluations Justifying Project Selection

PJM opened a long-term RTEP window from Oct. 30, 2014 through Feb. 27, 2015, to solicit, among other system needs, proposals to alleviate AP-South interface congestion identified in long-term simulation results, shown in **Table 2**. The AP-South Interface is shown on **Map 3**. PJM is required<sup>5</sup> to recommend transmission system enhancements to lower costs to customers if project benefits exceed costs by at least 1.25<sup>6</sup>. The benefit/cost calculation is described in APPENDIX A2: Benefit/Cost Ratio Calculation.

Submitted project proposals comprised system enhancements that would relieve congestion constraints for which no reliability-based RTEP project was already identified, as the 2014/15 Long-Term Window Problem Statement & Requirements document specified. PJM received 41 proposals to alleviate AP-South congestion. After extensive evaluation and stakeholder review, PJM selected and recommended the Transource project as approved by the PJM Board in August 2016.

Table 2 Long-Term Simulated Congesion on the AP-South Interface

			Input Assumptions with 2019 Topology								
			20	)15	20	019	;	2022	20	025	
Limiting Facility Type Area(s)		Area(s)	Frequency (Hours)	Market Congestion (\$M)	Frequency (Hours)	Market Congestion (\$M)	Frequency (Hours)	Market Congestion (\$M)	Frequency (Hours)	Market Congestion (\$M)	
AP-South for the loss of the Bedington-Black Oak 500 kV Line	Interface	РЈМ	1,525	\$84.9	1,799	\$110.2	1,503	\$130.6	1,733	\$182.3	

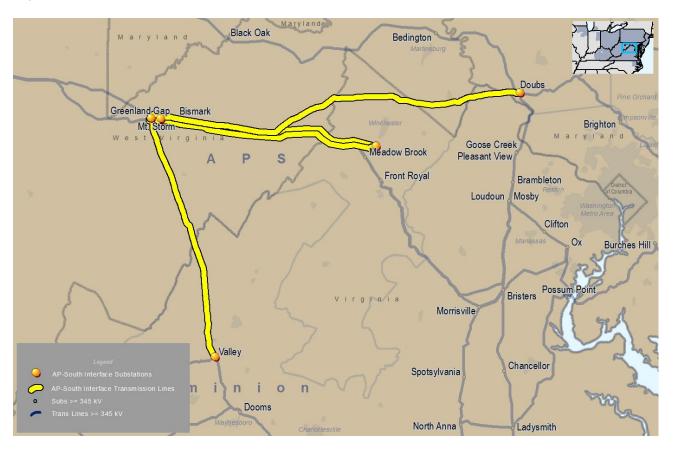
PJM © 2018 www.pjm.com 7 | P a g e

<sup>&</sup>lt;sup>5</sup> PJM's authority with respect to its planning process is based on its role as a FERC-approved RTO and its authority and responsibilities under the PJM Operating Agreement, the PJM Tariff and the PJM Consolidated Transmission Owners Agreement. The process is regulated by FERC. The final recommended RTEP is submitted to and approved by the PJM Board.

<sup>&</sup>lt;sup>6</sup> Governed by Section 1.5.7(d) of Schedule 6 to the PJM Operating Agreement.



Map 3 AP-South Interface



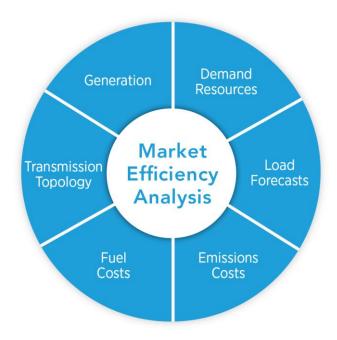
#### **Congestion Relief**

Congestion occurs when least-costly power available to serve load cannot be dispatched because transmission facility limits constrain power flow between two system points. This is the case with the AP-South Interface, shown earlier on **Map 3**. Power from lower-priced generating resources remote from eastern load centers, which include the Washington, D.C. and Baltimore metro areas, cannot flow freely to them. When this occurs, PJM's system operator must dispatch higher-cost resources to meet load at the receiving end of the constrained lines composing the AP-South Interface. The consequent locational marginal price (LMP) differences drive transmission congestion charges.

PJM market efficiency studies identified persistent congestion on the AP-South Interface over a 15-year planning horizon, shown earlier in **Table 2**. Production cost computer simulations show the extent of congestion under a given set of input parameters: fuel costs, emissions costs, load forecasts, demand resource projections, generation projections and expected future transmission topology, reflected in **Figure 2**.



Figure 2 Market Efficiency Analysis Parameters



#### **Evaluating Proposals**

Once the 2014/2015 long-term window closed, PJM evaluated proposals by comparing market efficiency simulation results with and without each project proposal over a 15-year horizon. The benefits yielded by these results were used to calculate a benefit/cost ratio for each project proposal to determine if further evaluation was justified.

Consistent with its FERC-approved process, PJM calculated each benefit/cost ratio by comparing the net present value of annual benefits determined for the first 15 years of project life to the net present value of the revenue requirement for the same 15-year period. Market efficiency transmission proposals that met the 1.25 benefit/cost ratio threshold were further assessed in order to examine their impact on system reliability, all prior to recommendation to the PJM Board for approval.

Reaching a recommendation for AP-South required a series of market efficiency studies and reliability analyses conducted over the course of 18 months, shown earlier in the **Figure 1** timeline. During those 18 months, PJM completed numerous analyses that first assessed which of the initial 41 projects met the 1.25 threshold and did not introduce additional reliability criteria violations that could not be alleviated themselves. Coupled with additional scenario studies that assessed the impact of load and natural gas price sensitivity and various proposal combinations, PJM ultimately determined that the Transource project met the benefit/cost threshold and provided the overall highest economic benefits.

#### **Evaluating Constructability**

Once the 2014/2015 Long-Term window closed, PJM proceeded with the analytical evaluation discussed above as well as constructability evaluation. More specifically, the PJM Operating Agreement Section 1.5.7(g) requires that PJM develop an independent cost estimate for market efficiency projects with cost estimates in excess of \$50 million,



as was the case with the Transource project and several others. PJM engaged an independent consultant who verified that the proposed costs, schedule duration and risks for the Transource project were within expected ranges for a project of this scope.

#### PJM Board Approves the Transource Solution

The project was approved by the PJM Board in August 2016, with an estimated cost of \$340.6 million and a required in-service date by June 1, 2020. Expected 15-year congestion and load payment savings were \$622 million and \$269 million, respectively. The Transource project as proposed by Transource Energy, LLC, was found to provide the more efficient and cost-effective benefits of the project proposals under consideration. The project includes a western component – Rice-Ringgold 230 kV line – and an eastern component – Furnace Run-Conastone-Northwest 230 kV line – shown earlier on **Map 1**, providing additional paths from the area 500 kV system to load on transmission at lower voltage levels. The project's elements are described in APPENDIX A3: IEC Project Components.

#### September 2017 Re-Evaluation

As part of its 2016/2017 market efficiency cycle – and consistent with established practice – PJM conducted a midcycle update to its production cost model to reflect the most recent updates to transmission topology, system loads, generation fuel costs, generation and emissions assumptions. New production cost simulations based on these updated parameters results yielded a \$600.73 million present value of net load payment benefit (for zones where payments decreased). Nominal project cost remained at \$340.6 million yielding a \$462.87 million 15-year present value annual revenue requirement. The benefit/cost ratio calculation itself yielded a 1.30 value, reaffirming justification for the Transource project. Given that the cost estimate had not changed since the original 2016 calculation, the lower benefit/cost ratio was attributable to reduced load payment benefits based on updated production cost simulation input parameters.

#### February 2018 Second Re-Evaluation

PJM conducted a second re-evaluation in February 2018 to reflect the most recent market efficiency base case released on Jan. 9, 2018. Importantly, that case reflected the January 2018 PJM Load Forecast. New production cost simulations based on these updated parameters results yielded a \$611.48 million present value of net load payment benefit (for zones where payments decreased). Project cost estimates had not changed since September 2017 – \$340.6 million – yielding a \$462.87 million 15-year present value annual revenue requirement. The benefit/cost ratio calculation itself yielded a 1.32 value, reaffirming justification for the Transource project. Given that the cost estimate had not changed since the original 2016 ratio calculation and September 2017 re-evaluation, the benefit/cost ratio – lower than the 2.48 original – was attributable to reduced load payment benefits based on updated production cost simulation input parameters.

#### September 2018 Third Re-Evaluation

PJM conducted a third re-evaluation during the summer of 2018. That study re-evaluated the Transource project under an updated project cost estimate of \$366.17 million and simulation input parameters. (The increase in cost included in the September 2018 cost update was due to non-Transource project elements of the Transource project.) Doing so yielded a benefit/cost ratio equal to 1.42 and congestion savings estimated at more than \$860 million over 15 years.



#### October 2018 IEC Benefit/Cost Ratio Update

In October 2018, Transource submitted updated cost estimates for its portion of the project, increasing the project capital cost from \$366.17 million to \$372.23 million. The updated cost estimates reduced the benefit/cost ratio from 1.42 to 1.40. A breakdown of individual element costs is included in APPENDIX A1.

#### PJM's Role

As background, PJM's federally authorized role in the RTEP process is to study the transmission system across its territory and identify the need for enhancements and expansions, solicit and evaluate proposals and designate developers (incumbent transmission owners and non-incumbent transmission developers) to implement Board-approved projects included in the RTEP. Given the long lead times required for new transmission facilities to reach commercial operation, PJM looks ahead up to 15 years to identify regional transmission expansion needs. PJM does not play a role in siting transmission facilities. The entity designated to build the RTEP project bears the responsibility to identify and secure rights of way and to obtain the necessary state and local approvals.

#### Conclusion

PJM's updated analyses continue to demonstrate that the Transource project continues to offer considerable economic and reliability benefits. For many years, the regional high-voltage transmission system has constrained the flow of the lowest-cost electricity into areas of eastern PJM, resulting in comparatively higher electric bills for customers who live in those areas. The Transource project will allow for a more efficient flow of low-cost energy into those areas. As a result, the project's benefits continue to justify the costs and it remains in PJM's RTEP. Today, such re-evaluations have also shown that the Transource project will address five identified reliability criteria violations that, if not addressed, could cause overloads on the transmission system as early as 2023. Additionally, the project will increase the Capacity Emergency Transfer Limit into the BGE LDA by 2023. As of September 2018, the project has submitted applications for certificates of public convenience and necessity before both the Pennsylvania Public Utility Commission and the Maryland Public Service Commission. If approved by the state regulators, the project may proceed. PJM will continue to re-evaluate the project periodically to ensure that, as system conditions evolve, the project remains beneficial to the region.



### V. APPENDIX A1: October 2018 IEC Project Cost Breakdown

Upgrade ID	Description	TO/ Designated Entity	Full In-Service Year Estimate
b2752.7	Conductor/rebuild the two Conastone-Northwest 230 kV lines and upgrade terminal equipment on both ends.		\$52.14
b2752.6	Conastone 230 kV substation tie-in work (install a new circuit breaker at Conastone 230 kV and upgrade any required terminal equipment to terminate the new circuit).	BGE	\$6.14
b2752.5	Build new 230 kV double-circuit line between Furnace Run and Conastone 230 kV, operated as a single circuit.	Transource	\$53.25
b2752.4	Upgrade terminal equipment and required relay communication at TMI 500 kV: on the Peach Bottom-TMI 500 kV circuit.	ME	\$2.00
b2752.3	Upgrade terminal equipment and required relay communication at Peach Bottom 500 kV: on the Peach Bottom-TMI 500 kV circuit.	PECO	\$2.00
b2752.2	Tie in new Furnace Run substation to Peach Bottom-TMI 500 kV.		\$6.90
b2752.1	Tap the Peach Bottom-TMI 500 kV line and create new Furnace Run 500 kV and 230 kV stations. Install two 500/230 kV transformers, operated together.	Transource	\$41.46
b2743.6.1	Replace the two Ringgold 230/138 kV transformers.		
b2743.6	Reconfigure the Ringgold 230 kV substation to double bus double breaker scheme.	APS	\$14.13
b2743.7	Rebuild/reconductor the Ringgold-Catoctin 138 kV circuit and upgrade terminal equipment on both ends.		\$47.04
b2743.5	Build new 230 kV double-circuit line between Rice and Ringgold 230 kV, operated as a single circuit.	Transource	\$98.35
b2743.4	Upgrade terminal equipment at Hunterstown 500 kV: on the Conemaugh-Hunterstown 500 kV circuit.	ME	\$0.20
b2743.3	Upgrade terminal equipment at Conemaugh 500 kV: on the Conemaugh-Hunterstown 500 kV circuit.	PENELEC	\$0.20
b2743.2	Tie in new Rice substation to Conemaugh-Hunterstown 500 kV.		\$15.16
b2743.1	Tap the Conemaugh-Hunterstown 500 kV line and create new Rice 500 kV and 230 kV stations. Install two 500/230 kV transformers, operated together.	Transource	\$33.26
		Total	\$372.2



#### VI. APPENDIX A2: Benefit/Cost Ratio Calculation

PJM uses a benefit/cost ratio test to determine whether an economic-based enhancement or expansion will be included in the RTEP. Specifically, to be included in the RTEP recommended to the PJM Board of Managers for approval, the relative benefits and costs of the economic-based enhancement or expansion must meet or exceed a benefit/cost ratio threshold of at least 1.25.

The benefit/cost ratio is calculated by dividing the present value of the total annual benefit for each of the first 15 years of the life of the enhancement or expansion by the present value of the total annual cost for each of the first 15 years of the life of the enhancement or expansion. Assumptions for determining the present value of the benefits and costs (e.g., discount rate and annual revenue requirement) are considered by the PJM Board of Managers each year to be used in the economic planning process.

The purpose of a benefit/cost ratio threshold is to hedge against the uncertainty of estimating benefits in the future and to provide a degree of assurance that a project with a 15-year net benefit near zero will not be approved. At the same time, the threshold is not so restrictive as to unreasonably limit the economic-based enhancements or expansions that would be eligible for inclusion in the RTEP.

Additional information explaining PJM's market efficiency process and the benefit/cost ratio in particular can be found in Manual 14B, "PJM Region Transmission Planning Process," Section 2.6 and Attachment E: <a href="https://www.pjm.com/media/documents/manuals/m14b.ashx">https://www.pjm.com/media/documents/manuals/m14b.ashx</a>



#### VII. APPENDIX A3: IEC Project Components

Project 9A, shown on **Map 1**, was approved by the PJM Board of Managers in August 2016 and includes the following components, designated to Transource and incumbent transmission owners as noted:

- The West Line: Approximately 27 miles of new double-circuit 230 kV alternating current overhead transmission line configured in a six-wired arrangement between the existing Ringgold Substation to a new Rice Substation that will tie into the existing Conemaugh-Hunterstown 500 kV line, assigned to Transource.
- The Ringgold Substation will be reconfigured and expanded to accommodate the new 230 kV circuit, assigned to APS.
- The new Rice Substation will include two 900 MVA, 500/230 kV transformers, one 230 kV breaker in a single bus configuration and three 500 kV breakers in a ring bus configuration, assigned to Transource.
- The East Line: Approximately 14.5 miles of new double-circuit 230 kV alternating current overhead transmission line configured in a six-wired arrangement between the existing Conastone Substation to a new Furnace Run Substation that taps the existing Three Mile Island-Peach Bottom 500 kV line, assigned to Transource.
- The new Furnace Run Substation will include two 900 MVA, 500/230 kV transformers, two 230 kV double-line terminal breakers and three 500 kV breakers in a ring bus configuration, assigned to Transource.
- The Conastone Substation will be expanded to accommodate the new double-circuit 230 kV lines and two new 230 kV breakers, assigned to BGE.
- Reconductor the Conastone-to-Northwest double-circuit 230 kV line, assigned to BGE.
- Replace the Ringgold No. 3 and No. 4 transformers with 230/138 kV autotransformers, assigned to APS.
- Reconductor the Ringgold-Catoctin 138 kV line, assigned to APS.

#### **BEFORE THE** PENNSYLVANIA PUBLIC UTILITY COMMISSION

Application of Transource Pennsylvania, LLC for approval of the Siting and Construction of the 230 kV Transmission Lines Associated with the Independence Energy Connection -East and West Projects in portions of Franklin and York Counties, Pennsylvania

Docket No. A-2017-2640195 Docket No. A-2017-2640200

Petition of Transource Pennsylvania, LLC for a finding that a building to shelter control equipment at the Rice Substation in Franklin County, Pennsylvania is reasonably necessary for the convenience or welfare of the public

Docket No. P-2018-3001878

Petition of Transource Pennsylvania, LLC for a

finding that a building to shelter control equipment at the Furnace Run Substation in York County, Pennsylvania is reasonably necessary for the convenience or welfare of the public

Docket No. P-2018-3001883

Application of Transource Pennsylvania, LLC for approval to acquire a certain portion of the lands of various landowners in York and Franklin Counties, Pennsylvania for the siting and construction of the 230 kV Transmission Lines associated with the Independence Energy Connection - East and West Projects as service. necessary or proper for the accommodation, convenience or safety of the public

Docket No. A-2018-3001881, et al.

#### TRANSOURCE PENNSYLVANIA, LLC

#### REBUTTAL TESTIMONY OF

#### JUDY CHANG

#### STATEMENT NO. 10-R

Date: November 27, 2018

- 1 Q. Please state your name and business address.
- 2 A. My name is Judy Chang. My business address is One Beacon Street, Suite 2600, Boston,
- 3 MA 02108.

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- 5 Q. By whom are you employed and in what capacity?
- 6 A. I am a Principal of The Brattle Group, an economic and finance consulting firm.

- 8 Q. Please describe your professional and educational background.
- 9 A. I have over 20 years of experience in advising energy companies on regulatory and 10 financial issues, including investment decisions in transmission. I have submitted expert 11 testimonies to the U.S. Federal Energy Regulatory Commission, U.S. state and Canadian 12 provincial regulatory authorities on topics related to transmission planning, access, and 13 pricing; resource planning; and power purchase and sale agreements. Relatedly, I have 14 conducted analyses to advise clients on various topics across the energy sector, including 15 evaluating proposed transmission projects, forming or expanding regional electricity 16 markets, approaches to integrating renewable energy onto power systems, and proposed 17 energy and environment policies. I have estimated the economic impacts associated with 18 transmission and renewable energy investments and provided public policy advice to 19 policymakers regarding energy investments. I have presented at a variety of industry 20 conferences and have presented at graduate school seminars on energy and environmental 21 policies at Harvard Law School, Tuft's Fletcher School of Law and Diplomacy, and 22 MIT's Sloan School of Management. I hold a Bachelor of Science in Electrical

Engineering and Computer Science from University of California, Davis and a Master of
Public Policy from Harvard Kennedy School.

#### 4 Q. What is the purpose of your testimony?

I describe the economic benefits associated with the proposed Independence Energy
Connection Project ("IEC Project" or "the Project"). Specifically, these benefits include
those that the project can provide to electricity customers in Pennsylvania. Further, I
estimate the potential employment and economic stimulus impacts associated with the
construction of the IEC Project.

#### Q. Please describe the IEC Project.

A. The IEC Project is an electric transmission project that is a component of PJM's Market Efficiency Project 9A. The project is designed to include approximately 45 miles of new 230 kV transmission line, separated into two segments. The western segment will connect from the newly constructed Rice substation located in Franklin County, Pennsylvania to the Ringgold substation in Washington County, Maryland. The eastern segment will connect from another new substation, Furnace Run, in York County, Pennsylvania to the Conastone substation in Harford County, Maryland. The IEC Project includes the construction of two new substations, one at each of the northern ends of the segments in Pennsylvania.

#### Q. Please summarize the findings of your testimony.

I present several benefits of the IEC Project that are not considered in PJM's estimate of the benefits of the Project. In the first section of the testimony, I discuss how PJM's estimate of the benefits from the IEC Project is conservatively low, as it only considers one type of benefit—transmission congestion relief—that will be provided by the Project. While PJM's approach is sufficient for the purpose of PJM's market efficiency analysis, I explain that additional economic benefits will accrue to Pennsylvania electricity customers due to the Project. These benefits include: improved reliability of the transmission system and avoided reliability-related transmission costs; enhanced operation of the PJM market; capacity market efficiencies; storm hardening; and insurance against extreme market conditions and different future policies that would significantly affect the way the electricity grid will be used.

The second part of the testimony presents an analysis I conducted to estimate the employment and economic stimulus benefits to the local economies in Franklin and York Counties in Pennsylvania, the rest of the state of Pennsylvania, and in Maryland. That analysis finds that the construction of the IEC Project will support between 74 and 93 jobs and generate between \$25.6 million and \$29.6 million in economic activity in Pennsylvania. In addition, the construction of the IEC Project will create between \$530,000 and \$660,000 in tax revenue for state and local governments within Pennsylvania.

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<del>1</del>	BENEFITS FROM THE IEC PROJECT FOR PENNSYLVANIA ELECTRICITY
2	<b>CUSTOMERS NOT CONSIDERED IN PJM'S ANALYSIS</b>

- Warious parties argue that PJM's market efficiency analysis overstates the overall benefits of the IEC Project (See OCA St. No. 1, pp. 34, 42; Shaw St. No. 1, pp. 16-17). Do you agree with these comments?
- A. No. PJM has conducted its market efficiency analysis solely to quantify the benefits associated with relieving transmission congestion in PJM. However, the IEC project will bring other benefits to electricity users across PJM, which PJM's analysis did not consider.

Q: Please describe the additional benefits of the Project that you reference in your response above.

High-voltage transmission infrastructure, like the IEC Project, provides many benefits to the electric power system and the associated electricity customers in the region. The analysis used by PJM to estimate the market efficiency benefit of the Project is focused on only one specific type of benefit—congestion relief in the PJM market. As described in the testimony of PJM Witness Horger, the IEC Project is designed to alleviate congestion on the AP-South constraint. This type of congestion relief is important for the PJM market to continue to function efficiently and provide low-cost power to all electricity customers in its footprint, but it is not the only benefit the IEC Project will deliver to electricity customers in the region.

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<sup>\*</sup> See Rebuttal Testimony of PJM witness Steven R. Herling, Transource St. No. 7-R.

The benefit analysis conducted by PJM is conservative for two reasons. First, the PJM analysis studies the congestion relief provided by the IEC Project only under normal system conditions. This ignores the type of system conditions, such as high load situations and system outages that typically increase transmission congestion and augment the value of a project like the IEC beyond those experienced under normal system conditions. Second, the PJM analysis considers only congestion relief benefits and does not account for the other benefits electricity customers in Pennsylvania will experience due to the construction of the IEC Project.

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Please explain why the analysis produces conservatively low benefits when PJM studies only normal system conditions in determining the congestion relief benefits of the IEC Project.

The PJM study simulates how much congestion is reduced by the IEC Project under normal system conditions. That means that the PJM simulation does not take into account any transmission outages, both expected and unexpected, or high load conditions driven by weather events, such as heat waves or cold snaps. System conditions, such as a sudden spike in load or outages, can cause congestion that is much higher than what PJM has simulated, often increasing the costs to electricity users. These conditions can occur unexpectedly, and at times in locations where PJM usually does not experience congestion. Transmission investments that reduce congestion, improve the robustness of the transmission system, and increase the efficient use of power generation across the PJM footprint are typically more valuable and beneficial to customers during these system events, that are not accounted for in PJM's analysis of benefits.

There have been several recent examples of extreme conditions or events in PJM
that can illustrate how system congestion increases under high load or outage conditions;
for example the Polar Vortex extreme cold conditions in January 2014 and the Cold Snap
in December 2017 and January 2018. During both of these extreme weather and
therefore electricity usage events, unusually high load conditions and generation outages
caused unusually high congestion on PJM's system. The elevated levels of congestion on
the PJM system cause prices to spike up to abnormally high levels. For example, the
service territories of Metropolitan Edison Co. (METED), PECO, and PPL Electric
Utilities experienced average day-ahead wholesale electricity prices of \$308/MWh,
\$311/MWh, and \$308/MWh, respectively, during the 12 days from January 20-31,
2014. <sup>2</sup> This compares to the average day-ahead price in PJM during the year 2013 prior
to the Polar Vortex of \$37.15/MWh. <sup>3</sup>

Day-ahead congestion in the PJM market was \$720 million<sup>4</sup> in just a few days, from January 20–31, 2014, which represented over 32% of the annual day-ahead congestion for all of 2014.<sup>5</sup> I understand that the AP-South constraint was the most constrained interface in PJM during that period, accounting for nearly \$285 million of

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Average prices are calculated using the hourly day-ahead zonal prices for METED, PECO, and PPL. Data were sourced from the ABB Velocity Suite.

<sup>&</sup>lt;sup>3</sup> "2013 Annual State of the Market Report for PJM Volume 2: Detailed Analysis", Monitoring Analytics, LLC, Section 3, p. 60, March 13, 2014.

<sup>&</sup>lt;sup>4</sup> "PJM Cold Snap Performance December 28, 2017 to January 7, 2018," PJM Interconnection, February 26, 2018, p. 25.

Total day-ahead congestion in PJM during 2014 was \$2,231.3 million. See "2014 State of the Market Report for PJM Volume 2: Detailed Analysis", Monitoring Analytics, LLC, Chapter 11, p. 389, March 12, 2015.

day-ahead congestion during those 12 days. Similarly, during the 12 days from December 28, 2017 through January 8, 2018, the day-ahead congestion in PJM was \$435 million, or over two-thirds the amount of congestion experienced in the entire first quarter of 2018 (\$641.7 million). None of these types of events is captured in PJM's congestion relief analysis because the type of analysis conducted by PJM are based only on assumptions that represent normal and anticipated system conditions. Since very large cost savings associated with congestion relief provided by high-voltage transmission lines such as the IEC Project would accumulate during these types of extreme events, PJM's analysis and finding of congestion relief benefits are conservative in nature.

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Q. Is congestion relief, including those during extreme system conditions, the only benefit Pennsylvania electricity customers will receive from the IEC Project?

A. No. In addition to providing congestion relief, the IEC Project will deliver other benefits

for electricity customers in Pennsylvania and surrounding regions. In Table 1 below, I

list the potential values that the IEC Project is likely to deliver to Pennsylvania electricity

users.

<sup>&</sup>lt;sup>6</sup> "PJM Cold Snap Performance December 28, 2017 to January 7, 2018," PJM Interconnection, February 26, 2018, p. 26.

<sup>&</sup>lt;sup>7</sup> "PJM Cold Snap Performance December 28, 2017 to January 7, 2018," PJM Interconnection, February 26, 2018, p. 25.

<sup>&</sup>lt;sup>6</sup> "2018 Quarterly State of the Market Report for PJM: January through March", Monitoring Analytics, LLC, Section 11, p. 501, May 10, 2018.

**Table 1: Sample of Benefits Provided by Transmission Infrastructure Projects** 

Benefit Category	Transmission-Provided Benefit	Accounted for in PJM Analysis of IEC Project
Traditional Production Cost Analysis	<ul> <li>Congestion relief under normal system conditions</li> </ul>	✓
Additional Production Cost Analysis	<ul> <li>Mitigation of extreme weather/load events and system contingencies</li> <li>Reduced congestion due to system outages</li> <li>Reduced transmission system losses</li> </ul>	×
Reliability Benefits	Avoided or deferred reliability projects	*
Capacity Market Benefits	<ul> <li>Increased import/export capability between capacity zones in PJM market</li> </ul>	×
Market Benefits	<ul><li>Enhanced competition in the PJM market</li><li>Increased market liquidity</li></ul>	*
Storm Hardening	• Improved flexibility of the transmission system in cases of damage from severe weather events	×
Public Policy / Customer Choice Benefits	<ul> <li>Reduced cost of meeting policy and other customers power purchase goals (e.g., increasingly higher levels of renewable energy purchases)</li> </ul>	*
Insurance Value	<ul> <li>Having a robust and flexible transmission system can deliver cost savings or mitigate increases under uncertain market futures</li> </ul>	×
Benefits Beyond 15-year Time Horizon	• Transmission infrastructure provide benefits throughout its entire useful life, which is generally much longer than 15 years	×

Table 1 above provides a more comprehensive range of potential economic benefits that the IEC Project could provide to Pennsylvania electricity users. For example, the IEC Project, even though it was not approved explicitly for reliability reasons, enhances the reliability of the system and thereby reduces the need for future projects or upgrades to address reliability issues. In its latest evaluation of the benefits of the IEC Project, PJM

has found that if the IEC Project were not built, five additional transmission elements would need to be upgraded or enhanced to maintain the continued reliability of the PJM system. The five elements identified by PJM are entirely or partially located in the state of Pennsylvania. This means that the IEC Project, in addition to providing significant congestion relief and other economic benefits, maintains the reliability of the overall transmission system, including the grid located in Pennsylvania. If the IEC Project were not built, the reliability issues that PJM has identified would need to be addressed through investments in other transmission upgrades or replacements, and the costs of those investments would likely be paid by the electricity customers of the utilities that would have to address the five reliability violations in their service territories. Overall, PJM's identification of these reliability needs in the absence of IEC shows that constructing the IEC Project avoids other reliability transmission projects and thereby saves ratepayers money by doing so. Such avoided reliability costs are true cost savings that have not been considered in PJM's market efficiency analysis.

As stated in Table 1, new transmission lines can further produce benefits in the PJM capacity market by increasing the ability to import and export capacity across the capacity zones within PJM's footprint. This can help lower prices in the areas of PJM that have been subject to higher capacity prices, such as the eastern portions of

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<sup>&</sup>quot;Transource AP-South (2014/15\_9A) Project Reevaluation," PJM Transmission Expansion Advisory Committee, September 13, 2018, p. 4.

The five elements are: 1) a transformer at Three Mile Island, 2) a conductor on the Peach Bottom-Conastone 500kV line, 3) a conductor on the Hunterstown-Lincoln 115kV line, 4) a conductor on the Lincoln Tap-Lincoln 115kV line, and 5) a conductor on the Lincoln-Straban 115kV line. The Peach Bottom-Conastone 500kV line is partially located in Maryland. The other 4 elements are located in Pennsylvania.

<del>1</del>	Pennsylvania. <sup>11</sup>	PJM has	recently	identified	this	as an	additional	benefit	of th	e IEC
2	Project. 12									

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4 Q. The PJM analysis of benefits from the IEC Project focuses on the reduction in load
 5 payments due to congestion relief over the first 15 years of the IEC's useful life.
 6 Will the IEC Project stop providing benefits after being in service for 15 years?
 7 A. No. Transmission infrastructure, like the IEC Project, generally has a useful life that is

well beyond 50 years <sup>13</sup> and will continue to provide benefits as long as it is in service. The IEC project will continue to provide congestion relief and other benefits beyond the 15 year time horizon studied by PJM. In fact, one of the benefits transmission infrastructure, like the IEC Project, provides electricity customers is its ability to provide reliability and flexibility value far into the future even when future system conditions and regulatory policies for the power sector are uncertain today. Transmission infrastructure, like the IEC Project, provides insurance value against changing system conditions in the future because it has a long useful life and will continue to enhance the flexibility of the electric grid as long as it remains in service.

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The Philadelphia Electric Co. (PECO) and Metropolitan Edison Co. (METED) areas both experienced higher prices than parts of western Pennsylvania, West Virginia, and Virginia in the capacity auction conducted in May 2017 for the 2020/2021 delivery year. See 2020/2021 RPM Base Residual Auction Results located here: <a href="https://www.pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2020-2021-base-residual-auction-report.ashx?la=en">https://www.pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2020-2021-base-residual-auction-report.ashx?la=en</a>

See "Transource AP-South (2014/15\_9A) Project Reevaluation," PJM Transmission Expansion Advisory Committee, September 13, 2018, p. 5.

See Rebuttal Testimony of Company Witness Kamran Ali, Transource PA St. No. 2-R.

The Office of Consumer Advocate witness, Mr. Geoffrey C. Crandall, states that the addition of energy efficiency, distributed generation (including combined heat and power), demand response, and renewable energy resources ("non-transmission alternatives") in Virginia, Maryland, and Washington DC will alleviate congestion on the AP-South constraint and reduce the need for the IEC Project.<sup>14</sup> Will adding non-transmission alternatives in Virginia, Maryland, and Washington DC provide the same benefits as the IEC Project?

No. The non-transmission alternatives discussed by Mr. Crandall are not able to deliver the full range of benefits that the IEC Project can provide. Non-transmission alternatives, like the resources Mr. Crandall describes, may be able to provide some of the benefits listed in Table 1 in the areas where they are deployed. However, the non-transmission alternatives cannot simultaneously provide all of those benefits across a broader section of the PJM footprint like the IEC Project.

For example, as PJM's analysis shows, the IEC Project provides congestion relief benefits for customers in Virginia, Maryland, and Washington DC, but the Project also provides reliability benefits for electricity customers in Pennsylvania in the form of avoided or deferred reliability investments. Non-transmission alternatives in Virginia, Maryland, and Washington DC may be able to reduce prices in those areas in some of the hours, depending on how they might be deployed and other factors on the system, but they will likely be unable to avoid reliability-related investments in Pennsylvania.

In addition, the IEC Project provides insurance value against unforeseen future market conditions, both in the near-term and in the long-term. While non-transmission

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<sup>&</sup>lt;sup>14</sup> OCA St. No. 3, p. 30.

alternatives can reduce load when they are activated and can be valuable, they are not likely to provide long-term insurance against unforeseen policies or system conditions in a systematic manner. For instance, the IEC Project will increase grid flexibility and the ability of the PJM transmission system to transfer power between Pennsylvania and Maryland for many decades to come. This flexibility and capability provided by the IEC Project can help the PJM market significantly by helping the operators manage the power transfers under future changes such as generation retirements or additions, shifts in the geographic dispersion of load, or significant changes in fuel prices.

As an example, if power prices in the Virginia, Maryland, and Washington DC area decrease due to the installation of renewable energy resources, as Mr. Crandall suggests would be possible, the IEC Project would still provide benefits to Pennsylvania electricity customers by helping PJM manage the intermittent production from these new renewable resources and allow increasing the flows of any such low-cost energy into Pennsylvania. Non-transmission alternatives are local solutions and do not add flexibility to the transmission system like the IEC Project would be able to provide. Therefore, non-transmission alternatives do not always provide the same type of insurance against unforeseen market conditions that the IEC Project can provide.

### JOBS AND ECONOMIC STIMULUS IMPACT ANALYSIS FOR THE IEC PROJECT

Q. Various parties argue that the Project does not provide employment or economic stimulus value to Pennsylvania (*see*, *e.g.*, Tr. at pp. 1060, 1075, 1101, 1128, 1135). Do you agree with this position?

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A. No, I do not agree. In addition to the various benefits from the new transmission facilities outlined above, I have performed a study of employment and economic impacts from the Project.

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#### 5 Q. Please summarize the results of the employment and economic impact analysis.

6 A. Across Pennsylvania and Maryland, I estimate that during the construction phase of the 7 Project, Transource's investment will support the equivalent of between 85 to 112 fulltime equivalent years ("FTE-years") of employment.<sup>15</sup> stimulate between \$30.7 million 8 and \$36.8 million of economic activities, and generate between \$690,000 and \$900,000 9 of tax revenues for state and local governments. In Pennsylvania, I estimate that the 10 Project would support between the equivalent of 74 and 93 FTE-years and stimulate 11 12 between \$25.6 and \$29.6 million of economic activities. In addition, the construction of 13 the IEC Project will create between \$530,000 and \$660,000 in tax revenue for state and 14 local governments within Pennsylvania

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# Q. Please explain how you estimated the employment and economic stimulus impact of the IEC Project.

18 A. I gathered information about the Project's expenditures from Transource, including how
19 those investment dollars would be spent across materials, equipment, and labor, to
20 estimate the likely economic impact of the Project. Specifically I focused on the labor,

This employment figure includes FTE-years calculated using an economic impact model (IMPLAN) and figures provided by Transource, specifically Company Witness Stephen P. Stein. In the economic impact model used here, one FTE-year is equivalent to 52 weeks of 40 hour per week employment, and a single FTE-year could be one year-long full-time position or multiple part-time positions. Transource's estimates of FTE-years are based on a 50-hour work week, which primarily affects direct jobs.

materials, and equipment supplied from within the counties and states analyzed. After gathering the information about the expected investment, an input-output model, called IMpact Analysis for PLANing or IMPLAN, is used to estimate the employment and economic stimulus impact associated with the IEC Project. I have assumed that the investment dollars associated with paying for materials, equipment, and labor that would be procured from outside the localities analyzed would not induce local economic activities. The model reports the economic activities as the value of all goods and services sold throughout the supply chain (such as in the form of sale and resale revenues). Thus, reported economic output refers to the total flow of money that occurs throughout the local economy examined.

- Q. You stated that the IEC Project is part of PJM Market Efficiency Project 9A. Did you quantify the economic impacts of investments other than the IEC Project that are part of PJM Project 9A?
- 15 A. No, my analysis includes only the investments made by Transource as part of the IEC
  16 Project. While I understand that Project 9A also includes additional investments by other
  17 utilities, I did not estimate the potential economic impacts from investments other than
  18 the IEC Project.

- 20 Q. Please describe the IMPLAN model and your use of the model.
- A. IMPLAN is a well-established industry-standard model used by economists to estimate how an economy responds to a change in expenditures and adjusts in a way that the overall quantity of goods and services produced balances with the quantity consumed

across the economy. <sup>16</sup> Input-output models contain detailed relationships between the "outputs" of certain activities across various sectors of the economy (such as constructing new transmission infrastructure), to their required "inputs," (such as salaries paid to workers, spending on certain materials for the project, and the up-stream processes of producing the necessary materials and equipment that would be used in the project). It is an industry-standard approach to use an input-output model to estimate the impact of infrastructure investments on the various sectors of a state's or region's economy. The results that I report in this testimony can be interpreted as the economic activities that take place in the localities analyzed when Transource invests in the IEC Project.

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#### Q. What are the economic effects that you estimate using IMPLAN?

The impacts that I estimate using the IMPLAN model include: (1) the number of jobs supported in each county or state (measured in full-time-equivalent years or FTE-years); (2) the economic activities associated with the Project (increases in "economic output" as measured in total sales and resale revenues of businesses within the areas analyzed); and (3) the likely state and local tax revenues collected due to the Project during construction.

These effects are reported by IMPLAN as direct, indirect, or induced effects. Direct effects represent the changes in employment and economic activities in the industries that directly support the investment. For example, the investment in the IEC Project would include direct spending on design, engineering, and construction services.

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The IMPLAN economic impact modeling system is developed and maintained by the IMPLAN Group LLC, which has continued the original work on the system done at the University of Minnesota in close partnership with the U.S. Forest Service's Land and Management Planning Unit. IMPLAN divides the economy into 440 sectors and allows the user to specify the expenditure allocations associated with a given expansion in demand to all relevant parts of the local economy in order to derive the economic impacts—changes in employment, earnings, and economic output.

Indirect effects measure the changes in the supply chain and inter-industry purchases associated with the transmission project, including the upstream activities associated with the construction and manufacturing of the equipment and materials used in the Project. These activities include, for example, the revenues for and the employment associated with the suppliers of transmission equipment and installation supplies, such as concrete. Induced effects represent the increased spending on housing, food, clothing, and other products and services by those directly or indirectly employed in the development and construction of the Project.

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- Which regions did you analyze in your economic impact analysis of the IEC Q. **Project?**
- 12 A. I analyzed the economic impact of the IEC Project in four distinct regions: (1) Franklin 13 County, Pennsylvania; (2) York County, Pennsylvania; (3) the remaining part of 14 Pennsylvania ("Rest of PA"), and (4) Maryland.

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- 16 When Transource invests in Maryland for the IEC Project, would there be any spill-Q. over effects in Pennsylvania? If so, have you analyzed the cross-regional effects?
- 18 Yes, when spending occurs in Maryland, there may be spill-over effects into A. 19 Pennsylvania, and vice versa. I use IMPLAN's Multi-Regional Input-Output (MRIO) 20 model to estimate the likely economic impact of Transource's investment in each region 21 separately, which automatically accounts for cross-regional impacts. Even though the 22 investment dollars are provided based on the location of the spending, the model 23 considers the interactions among employment, taxes, trade flows, and other aspects of the

local economy such that the results capture the spill-over effects that would occur due to the movements of workers and goods traded across the jurisdictional borders. For example, when using the IMPLAN MRIO model, the investment dollars assumed to be made by Transource in Franklin County, PA would affect the regional economy and may yield indirect and induced effects in the surrounding areas, including York County, PA, other parts of Pennsylvania, and Maryland. Thus, in reporting the estimated economic impact, I pay particular attention to account for the interactions across county and state boundaries.

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#### Q. Why did you model Pennsylvania as three regions and Maryland as one region?

I modeled the states differently due to the geographic distribution of the proposed project. The IEC Project will include over 37 miles of new transmission line in Pennsylvania and approximately 7.5 miles of new transmission line in Maryland. Since a significant portion of the physical infrastructure will be constructed in Pennsylvania, I separately estimated the economic impact on Franklin and York Counties in Pennsylvania, as well as the rest of Pennsylvania.

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#### Q. How did you estimate the investment expenditures associated with the IEC Project?

I obtained the investment expenditures by spending category and location from Transource, specifically from Company Witness Stephen P. Stein. Those expenditure data reflect the best estimate of the local spending associated with building the IEC Project. For the purpose of this study, I use only the investments that will be made in the regions of interest: Pennsylvania and Maryland. For example, if Transource plans to

purchase materials or equipment from outside the two states, the amount budgeted for that spending is not included in my analysis because I assume that any spending outside of Pennsylvania and Maryland would not affect the economic activities in the two states of my focus. Similarly, any expenditures budgeted to hire workers from outside of the two states is assumed not to contribute toward the economic stimulus impact in the two states. One exception is the budget for paying for out-of-area workers' that will be working within Pennsylvania and Maryland on the construction of the IEC Project. The budgeted amount for lodging and meals for out-of-area works, in the form of "per-diem," is included in my analysis because I assume that those dollars would likely be spent on lodging and restaurants located in Pennsylvania and Maryland, which in turn contributes toward the local economies. I will explain how I estimated per-diem expenditures following a discussion of the other expenditures.

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#### Q. Please summarize the expenditures analyzed in the economic impact analysis.

The investment expenditures data were provided by Transource Witness Stephen P. Stein and a high and low estimate are summarized in Table 2 below. The table provides a range of the local investment dollars categorized by the type of spending. Specifically, Table 2 shows the estimated expenditures on materials and services that will be sourced from within the various localities analyzed, taxes paid on materials and services sourced from the local economy, earnings for in-area workers and other payments to local entities, and spending on food and lodging for out-of-area workers (per-diem spend).

The direct expenditures on materials and services that Transource expects to spend in the local economy, as shown in Table 2, exclude my estimates of the state and local taxes.

The estimates of the taxes are shown in row 2 of Table 2.

Table 2: Estimated Local Project Expenditures in Pennsylvania and Maryland Based on Cost Categories

Cost Category	Low Estimates	High Estimates
Materials and Services [1]	\$6,928,000	\$8,503,000
Taxes on Materials & Services [2]	\$26,000	\$36,000
Local Labor Compensation & Other Payments [3]	\$14,778,000	\$16,632,000
Per Diem Spend [4]	\$2,107,000	\$2,384,000
Total [5]	\$23,839,000	\$27,555,000

Note: The expenditures listed in this table include only the portion of total project costs Transource plans to spend locally in Pennsylvania and Maryland. Therefore, the range of \$23.8 to \$27.6 million shown in the table does not represent the total project costs, only the portion that will be spent locally. Values are rounded to the nearest \$1,000.

#### 4 Q. How did you allocate the Project's local spending to Pennsylvania and Maryland?

The investment amounts shown in Table 2 are allocated to the four regions based on the proportion of new transmission line miles being built in each region. For example, the proposed project will build 24.4 miles of new transmission line in Franklin County, PA, which is 55% of total line miles being constructed. Therefore, 55% of the local investment is allocated to Franklin County. This allocation of the investment dollars by line miles is used to represent how spending would affect the local economies due to the relative amount of spending and the associated structures of the local economies. Table 3 below shows the investment dollars that I estimate Transource would spend for the IEC

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For a subset of categories of expenditures, Transource was able to provide more specific estimates of local spend; this is why "Rest of PA" has direct expenditures in Table 3 despite not having any line miles of transmission.

Project in Pennsylvania and Maryland based on the high and low estimates provided by
Transource. These investment assumptions are used as input assumptions in the
IMPLAN model.

Table 3: Summary of IMPLAN Inputs for Analyzing Impacts on Pennsylvania and Maryland (in \$thousands)

		Frankl	lin (PA)	York	(PA)	Rest o	of PA	М	D	То	tal
Cost Category		Low	High	Low	High	Low	High	Low	High	Low	High
Materials and Services	[1]	\$2,257	\$2,745	\$1,175	\$1,429	\$2,663	\$3,013	\$833	\$1,316	\$6,928	\$8,503
Taxes on Materials & Services	[2]	\$15	\$18	\$7	\$9	N/A	N/A	\$4	\$9	\$26	\$36
Local Labor Compensation & Other Payments	[3]	\$8,085	\$9,099	\$4,208	\$4,736	N/A	N/A	\$2,485	\$2,797	\$14,778	\$16,632
Per Diem Spend	[4]	\$1,152	\$1,305	\$600	\$679	N/A	N/A	\$355	\$400	\$2,107	\$2,384
Total	[5]	\$11,509	\$13,167	\$5,990	\$6,853	\$2,663	\$3,013	\$3,677	\$4,522	\$23,839	\$27,555

Notes: Values are rounded to the nearest \$1,000..

Q. Please explain how you have estimated the taxes from the direct effects associated with the Project investment dollars included in Table 2 and Table 3?

I estimated the state and local tax revenues from <u>direct</u> spending on labor and materials shown in Table 2 and Table 3 using the IMPLAN model. Specifically, the IMPLAN model contains data and information on the tax rates assessed on the purchases of materials and services across various sectors of the economy. Thus, I used those data to estimate the amount of state and local taxes that Transource would likely pay when the investment dollars are spent on the local purchases of materials and services across the regions analyzed. The tax rate assumptions contained in the IMPLAN model are not specific to the construction of new transmission projects like the IEC. Thus, I used the tax rates typically used for the construction of new highways and streets as a proxy for

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estimating the local taxes likely to be associated with Transource's purchases of its project-related materials and services.<sup>18</sup>

The estimated state and local taxes associated with the purchase of materials and services for the Project are shown in row 2 of Table 2. I estimate that Transource will pay between \$26,000 and \$36,000 in state and local taxes when purchasing local materials and services across Pennsylvania and Maryland. However, additional direct, indirect, and induced tax revenues will materialize. For example, the money spent by Transource to hire local workers and purchase materials or services from local businesses will ripple through the economy, creating additional tax revenue for local and state governments.

### Q. Please explain how you estimate the "per-diem" expenditures shown in Table 2 and

**Table 3?** 

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The food and lodging expenditures (depicted as "per-diem spend") will have an impact on the local economies where the IEC Project is being constructed. The per-diem expenditures, shown in row 4 of Table 2 and row 4 of Table 3, are based on information taken from the U.S. General Services Administration's ("GSA") per-diem rates

It is reasonable to use same tax rates for the construction of new highways and streets as for taxes arising from Transource's direct expenditures on the IEC because Transource's estimates of local spending on the IEC Project and highway projects have significant similarities in terms of the sectors of the economy they affect. This means that due to the lack of a specific tax rate that would be applied when purchasing materials and services to build the IEC Project, I have implicitly assumed that the tax rates on the materials and services for the IEC Project are similar to those that would be applied when purchasing the materials and services associated with the construction of new highways and roads. Specifically, I used the level of local taxes that the IMPLAN model estimates for the amount of local IEC Project spending. I used this amount as the estimate of Transource's local taxes paid when purchasing material and services. The use of this proxy industry applies only to the estimation of direct-effect taxes. The other economic impacts described in this report, including the indirect and induced taxes, are estimated by building a custom industry in IMPLAN based on the specific sectors of the local economy Transource will impact through its investment.

designated for Pennsylvania and Maryland. The GSA establishes the per-diem rates for lodging and food to reimburse federal government employees for work-related travel. For fiscal year 2018, which runs from October 2017 through September 2018, the GSA has established a rate of \$93/day for lodging and \$51/day for meals and incidentals as the standard rate for Pennsylvania and Maryland. The salaries of out-of-area workers are not included in this analysis since I assume that all of the salaries for out-of-area workers would be spent outside of Pennsylvania and Maryland. I obtained information from Transource for the estimated number of out-of-areas workers to be employed on the IEC Project during construction. Transource estimates that the out-of-area workers will range between 56 and 64, and that construction will last approximately one year. Therefore, I estimate the amount of per-diem spend as the number of out-of-area workers times 260 workdays in the year (five days a week times 52 weeks in the year), times the per-diem rates specified by GSA.

I assume that the per-diem paid to out-of-area workers will be spent in the areas where the IEC Project will be constructed. The portion of the per-diem spent on lodging is allocated to the hotels and motels industry, while the portion spent on meals and incidentals is allocated to three food service sectors—food and beverage stores (e.g., grocery stores), full-service restaurants, and limited-service restaurants.

## Q. How do the inputs shown in Table 2 influence direct versus indirect and induced effects?

The standard rate for each state applies in all areas where the IEC Project is being constructed. See data provided on GSA's website: <a href="https://www.gsa.gov/travel/plan-book/per-diem-rates">https://www.gsa.gov/travel/plan-book/per-diem-rates</a>.

All of the expenditures shown in Table 3 represent local spending and as a result produce direct effects. The indirect and induced effects from expenditures depend on where local business procure materials and services. For example, if Transource purchases certain equipment from a supplier in Pennsylvania, the amount spent for those purchases would be considered local spending; this local spending would contribute to the direct effects of the IEC Project. But if that local supplier does not source all of the equipment sold to Transource locally, that "next layer" of local spending would reduce the level of indirect and induced effects on the economy of Pennsylvania compared to a situation where all of the upstream resources and services were procured locally. As a result, the indirect and induced effects may be lower than the direct effects.

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## Q. How did you estimate what portion of the investment dollars spent locally on materials and services would produce indirect effects?

For each category of investment in materials and services listed in Table 3 above, I used a combination of default assumptions contained within the IMPLAN model and assumptions provided by Transource as to the amount that likely would be provided by suppliers within the local region studied. These assumptions do not alter the total amount spent locally (which is shown in Table 3 above), they affect only the indirect and induced effects associated with the direct spending.

Within the IMPLAN model, the portion of each sector that is procured locally is reflected within the Local Purchase Percentage ("LPP"). The LPP assumptions included in the IMPLAN model incorporate the likely regional impacts of the local direct spending made in each industry sector, and the default LPP percentages in IMPLAN are derived

from data from the U.S. Bureau of Economic Analysis, the U.S. Census Bureau, and the analyses of regional trade-flow patterns. For example, an LPP of ten percent results in ten cents of every dollar spent in the modeled region and ninety cents spent elsewhere.

I reviewed the LPP for each category of materials and services listed in Table 4 with Transource's procurement team to determine if the percentage of locally sourced materials and services is relatively accurate for the IEC Project. For most of the materials and services categories, I retained the default LPP assumptions that are contained in the IMPLAN database. However, for certain categories I adjusted the default LPPs to reflect the Project specific information provided to me by Transource. If Transource knows that a likely vendor of a material or service will procure 100% of inputs from local sources, I reflect that in the input used in IMPLAN. For example, if Transource is planning to hire an environmental consulting firm with offices located in Pennsylvania, I assume that 100% of the money spent to hire that firm will be procured in Pennsylvania based on the information provided to me by Transource, whereas IMPLAN's default assumption may be only 68% of expenditures on environmental consulting will be procured locally in Pennsylvania. The percentages of how each spending would be sourced locally for each category of materials and services are presented in Table 4 below.

Table 4: Local Purchase Percentages (LPP) Used in the Modeling

Sector Description		Franklin (PA)	York (PA)	Rest of PA	MD
Sand and Gravel Mining	[1]	11%	32%	N/A	48%
Ready-Mix Concrete	[2]	3%	9%	N/A	58%
Construction of New Roadways	[3]	100%	100%	N/A	100%
Waste Management	[4]	100%	100%	N/A	95%
Spring and Wire Products	[5]	0.01%	5%	N/A	13%
Real Estate	[6]	N/A	N/A	100%	N/A
Architectural and Engineering	[7]	45%	77%	100%	92%
<b>Environmental Consulting</b>	[8]	37%	45%	100%	91%
Legal Services	[9]	N/A	N/A	100%	100%
Food and Beverage Stores	[10]	87%	86%	N/A	99%
Full-Service Restaurants	[11]	73%	72%	N/A	82%
Limited-Service Restaurants	[12]	84%	83%	N/A	90%
Hotels and Motels	[13]	0.02%	0.1%	N/A	2%

Source: IMPLAN's Regional Social Accounting Matrices adjusted to reflect estimates of local procurement provided by Transource.

The local direct investment shown in Table 3 and the LPPs presented in Table 4 make up the main inputs used in simulating the effect of the Project-related expenditures on local economies. After these inputs are finalized, the IMPLAN model is used to simulate the economic impacts of the investment dollars spent in each of the regions of interest.

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#### Q. Please summarize the results of your analysis.

The simulated economic benefits for Franklin County, York County, and the remaining part of Pennsylvania are presented in Table 5. The results are broken into three categories: (1) the number of jobs supported (measured in full-time equivalent years); (2) the amount of economic activity stimulated; and (3) the state and local taxes generated by the Project.

Table 5: Economic Impact of the IEC Transmission Project for Pennsylvania

		Franklir	n County	York C	County	Rest of Pennsylvania					
Impact Type		Low	High	Low	High	Low	High				
Jobs Supported (FTE-years)											
Direct Effect	[1]	11	16	6	9	19	21				
Indirect Effect	[2]	6	7	4	5	5	6				
Induced Effect	[3]	8	12	5	7	10	11				
Total Effect	[4]	25	35	15	21	34	37				
<b>Economic Activit</b>	<u>y Simul</u>	ated (thous	sands \$)								
Direct Effect	[5]	\$10,700	\$12,200	\$5,600	\$6,400	\$2,700	\$3,000				
Indirect Effect	[6]	\$800	\$900	\$700	\$800	\$1,200	\$1,300				
Induced Effect	[7]	\$1,100	\$1,600	\$800	\$1,100	\$2,000	\$2,300				
Total Effect	[8]	\$12,600	\$14,700	\$7,100	\$8,300	\$5,900	\$6,600				
State and Local T	axes (tl	<u>nousands \$</u>	1								
Direct Effect	[9]	\$80	\$110	\$40	\$50	\$90	\$110				
Indirect Effect	[10]	\$20	\$20	\$20	\$20	\$50	\$50				
Induced Effect	[11]	\$70	\$100	\$50	\$70	\$110	\$130				
Total Effect	[12]	\$170	\$230	\$110	\$140	\$250	\$290				

Notes: Values rounded to the nearest \$100,000 for Economic Activity and nearest \$10,000 for State and Local Taxes. Direct FTE-years include Transource's estimates, which are based on a 50-hour work week. IMPLAN FTE-year results assume a 40-hour work week.

Table 5 shows that the IEC project is expected to support 25 to 35 full-time jobs in Franklin County and between 15 and 21 full-time jobs in York County during construction. The project is expected to stimulate \$12.6 million to \$14.7 million in economic activity within Franklin County, and an additional \$7.1 million to \$8.3 million of economic activity within York County while under construction. The jobs supported and the economic activity stimulated in Franklin and York Counties represent about half of all the job-supported and two-thirds of local economic activity stimulated by the IEC project. As discussed in the previous section, the majority of the jobs supported and economic activity stimulated occur within Franklin and York Counties because the majority of the new transmission line and the two new substations will be constructed in these two counties. Lastly, Table 5 indicates that in Franklin County, the IEC project is

expected to generate between \$170,000 and \$230,000 of state and local taxes while under construction. Likewise, in York County, the project is expected to generate between \$110,000 and \$140,000 in state and local taxes.

Table 5 also presents the results for the rest of the state of Pennsylvania, outside of Franklin and York Counties. In the remainder of the state, I estimate that the IEC project will support between 34 and 37 FTE-year jobs, stimulate between \$5.9 million and \$6.6 million of economic activities, and generation between \$250,000 and \$290,000 of state and local tax revenues. These economic benefits are in addition to the benefits seen in Franklin and York Counties.

The sum of Pennsylvania and Maryland economic benefits, which represent the total local economic benefits that I estimate from Transource's investments in the IEC Project, is shown in Table 6.

Table 6: Economic Impact of the IEC Transmission Project for Pennsylvania and Maryland

	Penns	ylvania	Mary	/land	T	otal	
Impact Type		Low	High	Low	High	Low	High
Jobs Supported (	FTE-yea	ırs)					
Direct Effect	[1]	36	45	6	7	41	52
Indirect Effect	[2]	16	17	2	5	17	23
Induced Effect	[3]	22	30	4	7	26	37
<b>Total Effect</b>	[4]	74	93	11	19	85	112
<b>Economic Activit</b>	y Simul	ated (thous	sands \$)				
Direct Effect	[5]	\$19,000	\$21,600	\$3,400	\$4,300	\$22,400	\$25,900
Indirect Effect	[6]	\$2,700	\$3,000	\$700	\$1,300	\$3,400	\$4,300
Induced Effect	[7]	\$3,900	\$5,000	\$1,000	\$1,600	\$4,900	\$6,600
Total Effect	[8]	\$25,600	\$29,600	\$5,100	\$7,200	\$30,700	\$36,800
State and Local T	axes (th	nousands \$	)				
Direct Effect	[9]	\$210	\$270	\$70	\$90	\$280	\$360
Indirect Effect	[10]	\$90	\$90	\$30	\$50	\$120	\$140
Induced Effect	[11]	\$230	\$300	\$60	\$100	\$290	\$400
Total Effect	[12]	\$530	\$660	\$160	\$240	\$690	\$900

Notes: Values rounded to the nearest \$100,000 for Economic Activity and nearest \$10,000 for State and Local Taxes. Direct FTE-years include Transource's estimates, which are based on a 50-hour work week. IMPLAN FTE-year results assume a 40-hour work week.

The number of jobs supported by the IEC Project is presented in rows 1–4 of Table 6 above. The results indicate that Transource's investment in the IEC transmission project would support between 85 and 112 full-time FTE-years during construction, of which 74 to 93 would be in Pennsylvania. Rows 5–8 of Table 6 show that construction of the IEC Project would generate between \$30.7 million and \$36.8 million of economic activity in Pennsylvania and Maryland combined. Of this total, \$25.6 million to \$29.6 million would be in the state of Pennsylvania.

The overall economic activities stimulated are larger than the total local investment associated with the IEC Project because each dollar spent would have a rippling effect through the economy. For example, a dollar paid to a worker hired to

work on the Project may be spent at a restaurant where the worker eats with her family, and then be paid to staff at the restaurant, and later spent on housing by the restaurant staff. This ripple effect of spending throughout the economy creates economic activities larger than the total spending on the Project. As shown in Table 3, Transource is expecting to invest between \$20.2 and \$23 million in Pennsylvania to construct the IEC Project, and I estimate that this investment would stimulate between \$25.6 and \$29.6 million of economic activity in Pennsylvania.

The last section of Table 6 (rows 9–12) shows the amount of local and state tax revenues that will be collected during the construction of the IEC Project. The results of my analysis indicate that the Project will provide local and state governments in Pennsylvania between \$530,000 and \$660,000 during the construction phase.

#### Q. Does this complete your testimony?

14 A. Yes, it does. If necessary, I will supplement my testimony if and as additional issues 15 arise during the course of this proceeding.