BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF COLORADO

PROCEEDING NO. 21A-0096E

IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF COLORADO FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR COLORADO'S POWER PATHWAY 345 KV TRANSMISSION PROJECT AND ASSOCIATED FINDINGS REGARDING NOISE AND MAGNETIC FIELD REASONABLENESS.

UCA HEARING EXHIBIT 303

CROSS-ANSWER TESTIMONY OF CHRIS NEIL ON BEHALF OF THE COLORADO OFFICE OF THE UTILITY CONSUMER ADVOCATE

October 22, 2021

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LIST OF ATTACHMENTS

I. BACKGROUND

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Chris Neil and my business address is 1560 Broadway, Suite 200, Denver, CO 80202. A copy of my qualifications is included as Attachment CN-1.

II. PURPOSE OF CROSS-ANSWER TESTIMONY

Q. PLEASE IDENTIFY THE WITNESS THAT YOU WILL BE ADDRESSING IN CROSS-ANSWER TESTIMONY.

A. The principal statement that I will address in cross-answer testimony is Mr. Gene Camp's statement, "It is clear from Company Witness Hill's direct testimony that new generation will likely come on over the period of late 2025 and beyond. The first Power Pathway transmission segments will become operational by the end of 2025, and then the remaining segments will be operational by late 2026 and 2027."[1] The UCA takes issue with this statement. It is the position of the UCA that significant new resources could come on line before 2025. The UCA has proposed just this in proceeding 21A-0141E.[2] .

The UCA's belief is based on information from Public Service Company of Colorado ("PSCo" or the "Company") that has been presented in a number of forums outside this proceeding. This additional information will be presented below and includes PSCo's analysis and approval for 4,890 MW of renewable capacity to be interconnected on PSCo's existing transmission system in the east. All of that capacity is planned to be on line in the 2022-2025 time period.

Some of this evidence was released since direct and answer testimony was filed. Most recently, PSCo showed that it is currently reviewing whether another 4,195 MW of proposals for

[1] Hearing Exhibit 2701, Answer Testimony and Attachments of Gene L. Camp, p. 20:8-12.
[2] See Answer Testimony of Ms. Chelsea Hotaling (p. 14:7-22) and Mr. Chris Neil (Section III) in Proceeding No. 21A-0141E, Hearing Exhibit 503 and 504, respectively.

renewable capacity[3] from developers can be interconnected on PSCo's existing transmission system with 3,947 MW of that in the east. All of that capacity is planned to be on line in the 2023-2025 time period.

III. PSCO'S DISIS GENERATION INTERCONNECTION REQUESTS

Q. DO PSCO'S DEFINITIVE INTERCONNECTION SYSTEM IMPACT STUDIES DEMONSTRATE THE RENEWABLE CAPACITY CAN BE ADDED TO THE PSCO SYSTEM BEFORE "2025 AND BEYOND"?

A. Yes. PSCo's Definitive Interconnection System Impact Study ("DISIS") reports provide evidence of the availability of early renewable capacity before the "2025 and beyond" cited by Mr. Camp. These DISIS reports are discussed below and show how much renewable capacity PSCo has determined can be interconnected on the existing PSCo transmission system. The DISIS Reports show how much capacity developers have proposed, the type of capacity, and when the developers expect the project to be online. Moving a project forward in the DISIS process, however, generally requires the project to be selected in an ERP Phase II competitive solicitation or requires some other form of Commission approval. Thus, PSCo's DISIS reports show projects that will likely be submitted in the Phase II solicitation, and capacity that PSCo has studied and has concluded can be interconnected to the transmission system.

Q. WHAT PROJECTS WERE SUBMITTED IN THE FIRST DISIS REPORT?

A. The renewable projects in PSCo's first DISIS Report[4] are summarized in Table CN-1. The Report is dated October 16, 2020, which was well before PSCo filed the Pathways application on March 2, 2021. This Report is included as Attachment LM-4 of Hearing Exhibit 1700, the Answer Testimony of Mr. Larry Miloshevich filed in this Proceeding.

[3] Including standalone battery capacity.
[4] https://www.rmao.com/public/wtpp/Final_Studies/DISIS-2020-001_Phase%201%20Report.pdf

The on-line dates and counties shown in Table CN-1 are taken from PSCo's list of projects in its interconnection queue, which is included as Attachment CN-2.

As shown in Table CN-1, PSCo's Spring DISIS Report included 700 MW of wind and 1,227 MW of solar for a total of 1,927 MW of renewable capacity. The developers planned to have all of this renewable capacity online by the end of 2023, clearly qualifying as before "2025 and beyond."

Table CN-1 Renewable Projects from PSCo's Spring 2020 DISIS Report (MW)
Source: Attachment LM-4 and Attachment CN-2

ID.	Capacity (MW)	Service	Interconnection	ERZ	County	On-Line Date
Wind						
GI-2020-7**	700 MW	ERIS	Mirasol	5	Pueblo Cty	12/1/2023
Total Wind	700 MW					
Solar or Solar+Battery*						
GI-2020-1	199 MW	ERIS	Mirasol	5	Pueblo Cty	12/1/2023
GI-2020-3	199 MW	ERIS	Boone-Comanche	5	Pueblo Cty	12/ 1/2023
GI-2020-4	100 MW	ERIS	Mirasol	5	Pueblo Cty	12/ 1/2023
GI-2020-6	199 MW	NRIS	Pawnee-Missile	2	Adams Cty	11/15/2022
GI-2020-7**	300 MW	ERIS	Mirasol	5	Pueblo Cty	12/1/2023
GI-2020-10*	230 MW	NRIS	Com.-Midway	5	Pueblo Cty	12/1/2023
Total Solar	1,227 MW					
Total	**1,927 MW**					
Total 2022	199 MW					
Total 2023	1,728 MW					

** GI 2020-7 is a hybrid project with 700 MW of wind and 300 MW of solar.

Q. WHAT DO YOU MEAN BY ERIS AND NRIS?

A. These represent the two ways in the DISIS process that the developer can request that its project be interconnected to the PSCo system. "ERIS" is energy resource integration service and is an "as available" interconnection. NRIS refers to network resource integration service and provides firm transmission interconnection. ERIS projects will likely be curtailed before NRIS projects. NRIS projects probably have a higher chance of being rejected because a firm interconnection is

not available. This is another example of why developers need information on interconnection capacity, so developers can decide whether to request ERIS or NRIS service.

Q. HOW MUCH RENEWABLE CAPACITY WAS INCLUDED IN PSCO'S SECOND DISIS REPORT?

A. The renewable projects included in PSCo's Fall, 2020 DISIS Report[5] are shown in Table CN-2. The Report was dated March 1, 2021, which was the day before PSCo filed its Pathways case. This Report was included as Attachment LM-5 in the answer testimony of Mr. Miloshevich in this Proceeding. The Fall DISIS Report includes more wind than the first report, and only one renewable project in Pueblo County. Most of the projects have planned in-service dates of 2024.

Table CN-2 Renewable Projects from PSCo's Fall 2020 DISIS Report (MW)
Source: Attachment LM-5 and Attachment CN-2

ID.	Capacity (MW)	Service	Interconnection	ERZ	County	On-Line Date
Wind						
GI-2020-12	400 MW	ERIS	Midway-Waterton	2	Elbert Cty	12/ 1/2024
GI-2020-14	700 MW	ERIS	Midway-Waterton	2	Chey. Cty	12/ 1/2024
GI-2020-15	250 MW	ERIS	Pawnee-Ft Lupton	1	Morgan Cty	12/31/2023
Total Wind	1,350 MW					
Solar or Solar+Battery*						
GI-2020-13*	374 MW	ERIS	Boone-Comanche	5	Pueblo Cty	12/ 1/2024
GI-2020-16	199 MW	NRIS	Barr Lake	2	Adams Cty	10/31/2023
Total Solar	573 MW					
Total	**1,923 MW**					

Total 2023449 MW
Total 2024 1,474 MW

[5] https://www.rmao.com/public/wtpp/Final_Studies/DISIS-2020-002%20Phase%201%20Report.pdf

Q. HOW MUCH CAPACITY WAS INCLUDED IN PSCO'S THIRD DISIS REPORT?

A. PSCo's third DISIS Report[6] (Spring 2021) was released on August 30, 2021, which was after PSCo filed its Pathways application and shortly before answer testimony was due from the parties in this proceeding. The renewable projects included in PSCo's Fall, 2020 DISIS Report are shown in Table CN-3, and the Report is included as Attachment CN-3. This third DISIS Report shows a total of 1,040 MW capacity, all of which was solar. Most of this renewable capacity is available prior to 2025, but one 400 MW project is proposed for 2025 as demonstrated in Table CN-3.

Table CN-3 Renewable Projects from PSCo's Spring 2021 DISIS Report (MW)

Source: Attachment CN-3 and Attachment CN-2

ID.	Capacity (MW)	Service	Interconnection	ERZ	County	On-Line Date
Wind						
None						
Total Wind	0 MW					
Solar or Solar+Battery*						
GI-2021-1	200 MW	ERIS	Comanche	5	Pueblo Cty	12/31/2022
GI-2021-4*	42 MW	NRIS	Romeo 69 kV	5	Pueblo Cty	5/14/2024
GI-2021-6*	199 MW	NRIS	Green Valley-Sky R	2	Adams Cty	12/31/2024
GI-2021-8*	400 MW	NRIS	Pawnee	1	Morgan Cty	12/31/2025
GI-2021-9	199 MW	ERIS	Tundra	5	Pueblo Cty	12/ 1/2024
Total Solar	1,040 MW					
Total	**1,040 MW**					
Total 2022	200 MW					
Total 2023	0 MW					
Total 2024	440 MW					
Total 2025	400 MW					

Q. WHAT IS THE TOTAL RENEWABLE CAPACITY THAT PSCO HAS SAID CAN BE INTERCONNECTED ON PSCO'S EXISTING TRANSMISSION SYSTEM IN THE EAST IN ITS THREE DISIS STUDIES?

[6] https://www.rmao.com/public/wtpp/Final_Studies/3DISIS-2021-001%20Phase%201%20Study%20Report.pdf.

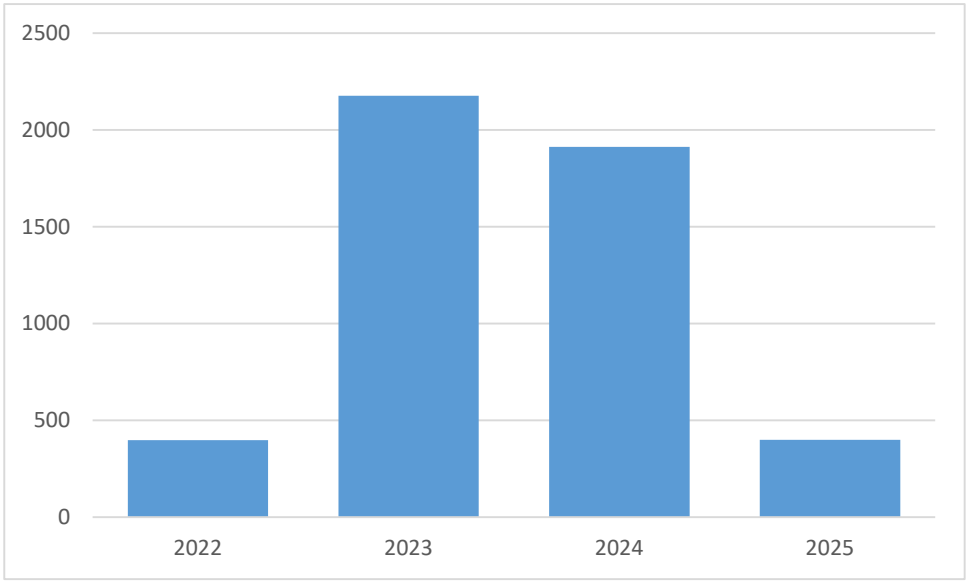
A. The renewable capacity that PSCo said could be interconnected on the existing transmission system in the east in its DISIS generation interconnection process is summarized in Table CN-4 and Figure CN-1 and totals 4,890 MW. There is roughly 2,000 MW proposed to be in-service in each of 2023 and 2024, and approximately 400 MW proposed to be in-service in each of 2022 and 2025. In total, 4,490 MW of renewable capacity has been proposed by developers in the DISIS Reports to be in-service by the end of 2024 or before.

Table CN-4 Renewable Capacity that Can be Interconnected on PSCo's Existing Transmission System in the East from PSCo's DISIS Reports (MW)

Total Wind	2,050 MW
Total Solar	2,840 MW
Total	4,890 MW

Total 2022	399 MW
Total 2023	2,177 MW
Total 2024	1,914 MW
Total 2025	400 MW
Total	4,890 MW

Figure CN-1 Renewable Capacity from PSCo's DISIS Reports by On-Line Year (MW)



Q. HOW MUCH ADDITIONAL RENEWABLE CAPACITY IS IN THE LATEST DISIS CLUSTER THAT PSCO IS CURRENTLY ANALYZING?

A. The current DISIS cluster has an additional 4,195 MW of renewable capacity. The window for this DISIS cluster opened on August 1, 2021 and closed on September 15, 2021. The list of projects is shown in Attachment CN-2, and the projects are summarized in Table CN-5. PSCo is currently analyzing this cluster, and a report will not be available for about six months. Because this cluster is still being studied, there may be some projects that drop out or that PSCo determines cannot be accommodated on the existing transmission system.

The projects in PSCo's fourth DISIS cluster include 1,362 MW of wind, 2,389 MW of solar or solar+battery and 444 MW of standalone batteries for a total of 4,195 MW. The developers proposed that 197 MW would be on-line in 2023, 2,007 MW in 2024 and 1,991 MW in 2025. Again, this is not consistent with statements such as "2025 and beyond.".

Developers proposed 3,947 MW in this cluster for the existing transmission system in the East. When combined with the 4,890 MW of projects in the first three DISIS Reports, this brings the total capacity proposed for the east to 8,837 MW (3,947MW + 4,890 MW = 8,837 MW). Developers proposed a total of 248 MW on PSCo's transmission system in the west in this fourth cluster. This includes a 199 MW solar project proposing to interconnect at the Hesperus substation in La Plata County in far southwest Colorado. Though located in Tri-State's service territory area, PSCo has rights on the transmission line to this substation.

Developers did not propose any capacity on the Pathways project in this fourth DISIS cluster.

Table CN-5 Renewable Projects from PSCo's Fall 2021 DISIS Cluster (MW)

Source: Attachment CN-2

ID.	Capacity (MW)	Service	Interconnection	ERZ	County	On-Line Date
Wind						
GI-2021-19	500 MW	ERIS	Tundra	5	Pueblo Cty	12/31/2025
GI-2021-20	500 MW	ERIS	Tundra	5	Pueblo Cty	12/31/2025
GI-2021-25	362 MW	NRIS	Pawnee	1	Sedgwick Cty	12/31/2024
Total Wind	1,362 MW					
Solar or Solar+Battery*						
GI-2021-12	250 MW	ERIS	Com-Mirasol-Midway	5	Pueblo Cty	10/31/2024
GI-2021-13	250 MW	ERIS	Mirasol	5	Pueblo Cty	12/31/2025
GI-2021-14	199 MW	NRIS	Green Valley	2	Adams Cty	6/ 1/2025
GI-2021-15	199 MW	NRIS	Tundra	5	Pueblo Cty	12/ 1/2024
GI-2021-17	199 MW	NRIS	Hesperus 345	W	La Plata Cty	12/20/2025
GI-2021-18	49 MW	ERIS	Colbran 138	W	Mesa Cty	12/31/2025
GI-2021-21	300 MW	NRIS	Boone-Midway	5	Pueblo Cty	12/ 1/2024
GI-2021-24*	197 MW	NRIS	GI-2020-6 (Paw-MS)	5	Pueblo Cty	12/31/2023
GI-2021-26*	197 MW	NRIS	Pawnee	1	Sedgwick Cty	12/31/2024
GI-2021-27*	180 MW	NRIS	Missile Site	2	Arapahoe Cty	12/ 1/2024
GI-2021-28	170 MW	NRIS	San Luis Valley	4	Alamosa Cty	12/ 1/2024
GI-2021-29*	199 MW	NRIS	GI-2020-6 (Paw-MS)	1	Adams Cty	12/31/2024
Total Solar	2,389 MW					
Battery						
GI-2021-16	199 MW	ERIS	Harvest Mile	2	Arapahoe Cty	12/31/2025
GI-2021-22	150 MW	NRIS	Boone-Midway	5	Pueblo Cty	12/ 1/2024
GI-2021-23	95 MW	NRIS	San Luis Valley	4	Alamosa Cty	10/ 1/2025
Total Battery	444 MW					
Total	4,195 MW					
Total 2022	0 MW					
Total 2023	197 MW					
Total 2024	2,007 MW					
Total 2025	1,991 MW					
West	248 MW					
East	3,947 MW					

IV. PSCO'S SUPPLEMENTAL DIRECT TESTIMONY AND ITS "FRONT LOADED" ALTERNATIVE

Q. DOES PSCO'S SUPPLEMENTAL DIRECT TESTIMONY ALSO INCORRECTLY SUPPORT THE "2025 AND BEYOND" TIMING?

A. Yes. Large amounts of renewable capacity can be added in 2022, 2023 and 2024, as clearly demonstrated above in PSCo's DISIS Reports. PSCo did not allow any renewable capacity to be added before 2025 in the cases in PSCo's Supplemental Direct Testimony in this proceeding, however. PSCo's Supplemental Direct cases were filed on September 3, 2021, which was after PSCo had issued all three of the DISIS Reports discussed above. PSCo approved the interconnection of 4,490 MW in the east on the existing transmission system prior to 2025 in these three DISIS Reports, yet PSCo did not allow any capacity prior to 2025 in the cases in its Supplemental Direct Testimony. Mr. Camp's concurrence with PSCo's 2025 date is not consistent with the data.

Q. DOES PSCO ACKNOWLEDGE THE TAX ADVANTAGES OF ADDING CAPACITY BEFORE THE END OF 2025?

A. Yes. Ms. Trammell states, "Federal tax incentive policy for renewable energy that makes 2025 an attractive year to integrate renewables."[7]

Q. IN ADDITION TO NOT ALLOWING ANY RENEWABLE CAPACITY TO BE ADDED PRIOR TO 2025, DID PSCO RESTRICT THE AMOUNT OF RENEWABLE CAPACITY THAT COULD BE ADDED IN 2025, 2026 AND 2027?

A. Yes. Mr. Hill clarified this in his Supplemental Direct Testimony. He stated:

[7] Hearing Exhibit 108, Supplemental Direct Testimony of Brooke A. Trammell ("Trammell Supplemental Direct"), p. 14:14-15.

> In developing portfolios, the Company limited the nameplate amount of renewables that could be added to the system each year within the EnCompass model for years 2025, 2026, and 2027. Renewable resources were limited to 1,000 megawatts ("MW") in each of these years in order to better align the timing of commercial operation of new wind and solar generation resources with estimates at the time as to when incremental transmission capacity would be provided from the Pathway Project.[8]

Q. DID PSCO ALLOW ANY RENEWABLE CAPACITY TO BE ADDED UNLESS IT WAS CONNECTED TO PATHWAYS?

A. No. PSCo's statement above makes it clear that PSCo did not allow any projects that were not connected to Pathways, despite PSCo determining that 4,490 MW could be interconnected on the existing transmission system in the east prior to 2025 in the three DISIS Reports.

Q. IS PSCO'S LIMITATION ON ADDING RESOURCES TO "2025 AND BEYOND" ALSO CONSISTENT WITH THE RESOURCE ACQUISITION PERIOD ("RAP")?

A. No. PSCo's Corrected Attachment AKJ-1 in Proceeding No. 21A-0141E states on page 27 the correct RAP period of 2021 to 2030:

> The resource acquisition period ("RAP") is the period of time over which the utility acquires specific generation resources to meet projected resource needs. For this 2021 ERP & CEP, SB 19-236 requires that the Company use a RAP through 2030 to align with the clean energy target of 80 percent emission reduction by 2030 from 2005 levels. Thus, **our bounded RAP is from 2021 through 2030**. (Emphasis added.)

In her direct testimony, Ms. Jackson clearly states the RAP period as 2021 through 2030.[9]

Q. IS PSCO'S LIMITATION OF ONLY 1,000 MW OF WIND REASONABLE?

A. No. The production tax credit ("PTC") decreases after 2025. Therefore, to maximize the available monies, wind projects should be added in 2025 or before, and not be limited artificially to 1,000 MW of wind or to "2025 and beyond" in the model.

Q. DID PSCO PROVIDE MORE EVIDENCE THAT EARLY RENEWABLE ADDITIONS ARE THE LOW-COST APPROACH?

[8] Hearing Exhibit 110, Supplemental Direct Testimony of James F. Hill, p. 7:13-19.
[9] Proceeding No. 21A-0141E, Jackson Direct, footnote 2, p. 16.

A. Yes. PSCo provided additional cases in the Supplemental Direct Testimony of James F. Hill in Proceeding No. 21A-0096E. These alternatives are summarized in Table CN-6 below. Mr. Hill's Approach #1 does not add renewable capacity until 2027. Approach #2 is the incremental approach that spreads the capacity out from 2025 to 2027. Finally, Approach #3 is Mr. Hill's "Front Load" approach where all 2,300 MW of wind is added in 2025, 800 MW of solar is also added in 2025, and an additional 750 MW of solar is added in 2026.

Table CN-6 Summary of Capacity Additions and Costs in PSCo's Alternatives
Source: Supplemental Direct Testimony of James F. Hill, Table JFH-SD-4 and SD-6

		Renewable Capacity (MW)			Net Present Value ($ M)	Difference
EOY=>		2025	2026	2027		
Approach 1	Wind			2,300	$3,323	-
(Wait)	Solar			1,550		
Approach 2	Wind	1,300	500	500	$3,005	-$318
(Incremental)	Solar		800	750		
Approach 3	Wind	2,300			$2,718	-$605
(Front Load)	Solar	800	750			

Q. WHAT IS THE DIFFERENCE IN COST FOR THESE ALTERNATIVES?

A. The Front Load Alternative (No. 3) is the lowest cost alternative in Mr. Hill's Supplemental Direct Testimony. The net present value ("NPV") from his testimony is also summarized above in Table CN-6. The NPV of the Front Load alternative has an NPV that is $605 million less than the alternatives that added renewables later, as in Alternative #1. The Front Load Alternative also has a NPV that is lower by $318 million than Alternative #2, which starts with 1,300 MW of wind in 2025, and the rest of the renewable capacity added in 2026 and 2027.

These cases demonstrate the cost benefits of the addition of early renewables and taking advantage of the PTC and investment tax credit ("ITC"). Mr. Hill points out that the NPV values shown above do not include any savings from earlier reductions from carbon emissions. He states:

> The values in Table JFH-SD-6 also do not include any additional cost or savings that would be associated with the timing of avoided carbon emissions and their associated costs. Including such costs would act to show increased savings (both nominal and NPV) of the approaches that add renewables earlier (e.g., Approach #2 and Approach #3) as compared to the other approaches studied. Moreover, the emission reductions under Approach #2 and Approach #3 would result in a steadier decline in emissions over the course of the RAP as we move forward in time toward the 2030 clean energy target. (Footnote omitted.)

Adding the emissions benefit from the addition of early renewables would further increase the benefits of the Front Load case.

Q. WHAT DO YOU CONCLUDE FROM THESE CASES?

A. PSCo's study of these Supplemental Direct alternatives demonstrates the benefits of early addition of renewables and demonstrates that acceptance that "new generation will likely come on over the period of late 2025 and beyond" is incorrect.

V. PSCO'S INJECTION CAPABILITY

Q. DOES PSCO'S INJECTION CAPABILITY PROVIDE FURTHER EVIDENCE OF THE ABILITY TO ADD RENEWABLE CAPACITY ON THE EXISTING TRANSMISSION SYSTEM PRIOR TO 2025?

A. Yes. PSCo's standalone injection capability provides further evidence that "new generation will likely come on over the period of late 2025 and beyond" is not the whole picture. The UCA believes that new generation could come on after 2025, but that there is significant potential to add generation before that year. PSCo's injection capability also helps explain how the projects in PSCo's DISIS reports can be interconnected.

Q. IS INJECTION CAPABILITY ALSO IMPORTANT INFORMATION FOR DEVELOPERS?

A. Yes. Developers need injection capability to provide them with a necessary starting point to develop a project to bid into Phase II. Developers will refine this with a generation

interconnection request, but developers need an initial idea of where they might be able to site a project.

Q. DID PSCO PROVIDE INJECTION CAPABILITY AT THE 80X30 TASK FORCE MEETINGS?

A. Yes. PSCo provided updated standalone injection capability in its presentation at the December 10, 2021 80x30 Task Force meeting (Attachment LM-3).

Q. PLEASE SUMMARIZE PSCO'S STANDALONE INJECTION CAPABILITY?

A. PSCo's standalone injection capability is summarized in Table CN-7 below. PSCo's injection capability sums to approximately 6,000 MW of injection capability. PSCo's injection capability shows a sum of 4,232 MW in the east and 1,765 MW in the west.

Table CN-7 PSCo's Injection Capability (MW)
Source: Attachment LM-3 CCPG 80x30 Task Force Presentation of 12/10/2020.

North Backbone 345 kV			
	Pawnee	200	
	Missile Site	200	
	Cheyenne Ridge	0	
	Harvest Mile	400	
	Brush	0	
Subtotal			800
Greeley 230 kV			
	Husky	200	
	Rosedale	N/A	
Subtotal			200
North 230 kV			
	Ft. St. Vrain	500	
	Ft. Lupton	400	
	Green Valley	500	
	Spruce	500	
	Cherokee	250	
	Keenesburg	400	
Subtotal			2,550
South Backbone 345 kV			
	Midway	100	
	Comanche	482	
	Boone	100	
	Lamar	0	
Subtotal			682
San Luis Valley 230 kV		0	
Subtotal East			**4,232 MW**
Western Colorado			
	Rifle	400	
	Hayden	448	
	Craig	342	
	Cameo	50	
	Uintah	50	
	Hartsel	50	
	Grand Junction	375	
	Parachute	50	
Subtotal West			**1,765 MW**
	Sum Colorado		**5,997 MW**

Q. DOES PSCO DISAGREE WITH SUMMING OR THE CUMULATIVE AMOUNT ON INJECTION CAPABILITY?

A. Yes. PSCo's Response to Discovery Request OCC 2-7 (Attachment CN-4) objects to summing the injection capability. The amount of injection capability can be dependent upon where the new projects are located because injection at one location can impact the injection capability at another location.

Q. DOES INJECTION CAPABILITY ALWAYS GO DOWN?

A. No. Injection capability can increase under several circumstances. For example, injection capability can increase with the retirement of other generating units or with purchase power contracts expiring. Injection capability can also increase in certain periods when generating units are switched to economic dispatch, reduced operation or seasonal dispatch (as discussed in the ERP proceeding). Similarly, injection capability can also be higher when units are off-line, such as PSCo approach to provide the necessary injection capability for Pathways (See PSCo's Response to Discovery Request OCC 4-17, Attachment CN-5).

Q. DOES PSCO'S FALL 2020 DISIS REPORT ALSO SHOW THAT PSCO'S INJECTION CAPABILITY COULD BE EVEN LARGER THAN WHAT PSCO SHOWED IN TABLE CN-7?

A. Yes. Developers have submitted proposals in the DISIS process at locations that PSCo did not indicate as available injection capability points in Table CN-7. The largest of these is in the Fall, 2020 DISIS Report that includes 1,100 MW of wind projects in GI-2020-12 and GI-2020-14 that proposed to connect on the Midway-Waterton line. PSCo's injection capability shown in Table CN-7 did not include any injection at Waterton or on the Midway-Waterton line. Including 1,100 MW on Midway-Waterton would increase PSCo's total injection capability from approximately

6,000 MW (5,997 MW in Table CN-7) to over 7,000 MW and the sum in the east would increase from 4,232 MW to 5,332 MW.

Q. ARE THERE OTHER REASONS WHY INJECTION CAPABILITY MAY BE CONSERVATIVE?

A. Yes. Projects connecting on an "as available" or on an ERIS basis do not require firm transmission capability. ERIS projects can share transmission capacity, such as wind and solar projects sharing the same transmission line. Many of the projects in the DISIS reports shown above are proposed as ERIS projects. For example, among the projects in PSCo's first DISIS report shown in Table CN-1, 1,498 MW of the 1,927 MW are proposed as ERIS projects.

Q. ARE THERE OTHER WAYS TO INCREASE INJECTION CAPABILITY?

A. Yes. Another way for a developer to be able to interconnect a larger project is for the developer to pay for the cost of greater injection capability. This is illustrated by GI-2021-8 in PSCo's third DISIS Report (Attachment CN-3). This project requested 400 MW of firm transmission capability (NRIS) at Pawnee. PSCo's injection capability in Table CN-7, however, shows that only 200 MW of injection capability is available at Pawnee. Yet PSCo approved the 400 MW project to be interconnected. PSCo's DISIS Report provides the explanation. The 400 MW project will overload the 230 kV Smoky Hill-Buckley-Tollgate line. Reconductoring 5.25 miles of line and the related termination equipment, etc. costs approximately $3.725 million. Further, the DISIS Report states that 100% of the cost of these upgrades will be assigned to project GI-2021-8.[10] Thus, the injection capability numbers shown in Table CN-7 can go up or down but can provide a starting point for developers.

[10] Attachment CN-3, Table 26, p. 41.

VI. PSCO'S TRANSMISSION MODELING OF LARGE INJECTION ON THE EXISTING TRANSMISSION SYSTEM

Q. DID PSCO PERFORM TRANSMISSION MODELING OF LARGE INJECTIONS ON THE EXISTING TRANSMISSION SYSTEM?

A. Yes. The CCPG 80x30 Task Force, led by PSCo, performed transmission modeling of balanced portfolios in Phase II of its work (Phase I was the development of the Pathway Project). A balanced portfolio spreads the projects across the entire state or service territory and does not use the Power Pathways transmission system. The best of these balanced portfolios that PSCo modeled included capacities ranging from 4,600 MW to 4,900 MW and are shown in Attachments LM-6 and LM-7. The principal balanced portfolios are summarized in Table CN-8. Portfolio P1 was developed by UCA, and Portfolios S1-S3 were developed by PSCo.

Table CN-8 Capacity in Balanced Portfolios (MW)
Source: Attachments LM-6 and LM-7

Area	Interconnection	P1	S1	S2	S3
West Slope	Craig	600	300	300	300
	Hayden	200	300	300	300
	Rifle	100	200	200	200
	Grand Jct	100	200	200	200
Northern Area	Husky	200	200	200	200
	Keenesburg	250	300	400	200
	Ft St Vrain	250	500	400	200
	Pawnee-Ft Lupton	250	300	400	200
Central Area	Missile Site	200	200	200	200
	Pawnee	500	200	200	200
	Pawnee-Missile	0	0	0	0
	Sidney-Pawnee	0	0	0	0
	Barr Lake	0	0	0	0
	Green Valley	500	500	300	300
	Spruce	0	500	300	300
San Luis Valley	San Luis Valley	60	0	0	0
Southern Area	Mirasol	1,230	500	1,000	1,100
	Boone-Comanche	200	200	200	500
	Boone-Midway	0	0	0	0
	Comanche	300	200	300	500
	Comanche-Midway	0	0	0	0
	Lamar-Tundra	0	0	0	0
	Midway-Waterton	0	0	0	0
	Total	**4,940**	**4,600**	**4,900**	**4,900**

Q. WITH APPROXIMATELY 4,600 MW TO 4,900 MW OF RENEWABLE GENERATION, DID THESE BALANCED PORTFOLIOS RESULT IN MANY OVERLOADED TRANSMISSION LINES?

A. No. The balanced portfolios resulted in few overloaded lines and fewer overloaded lines than the Pathways Project – see Table CN-9. Balanced Portfolio P1 with 4,940 MW of capacity resulted in the fewest overloaded transmission lines of any of the alternative studied: only two. These two overloaded lines from Portfolio P1 are 115 kV overhead lines, which means that the overloads

could probably be addressed by reconductoring the lines. This could cost only a few million dollars, or a fraction the $250 million that PSCo estimates it will cost to address the overloads on in the Pathways case.[11]

PSCo's balanced portfolios, S1-S3, also have relatively few overloaded lines and considerably fewer overloaded lines than the Pathways Case. Spreading injection over the entire service territory results in fewer overloaded transmission lines.

Table CN-9 Overloaded Lines in the Balanced Portfolios Compared to Power Pathways
Source: Power Pathways, Attachment ARK-5, Appendix B, Alternative #3

PSCo's CCPG 80x30 Task Force Presentation of 9/15/2021, Slide 8, Attachment LM-7

			Base	Overload	**Overloads for Balanced Portfolios**			
			Case	Power	**UCA**	**PSCo**	**PSCo**	**PSCo**
		Overhead/	Rating	Pathways	**Portfolio**	**Portfolio**	**Portfolio**	**Portfolio**
#	Overloaded Facility	Underground	(MVA)	Alt No. 3	**P1**	**S1**	**S2**	**S3**
1	Greenwood-Monaco 230	OH/UG	503	129%			102%	110%
2	Monaco-Sullivan 230	OH/UG	470	131%			101%	110%
3	Leetsdale-Sullivan 230	OH/UG	396	108%				
4	Buckley-Tollgate 230	OH	484	119%				103%
5	Buckley-Smoky Hill 230	OH	506	114%				
6	Leetsdale-Monroe 230	UG	396	116%				
7	Leetsdale-Harrison 115 kV	UG	141	105%				103%
8	Daniels Park-Prairie #1 230	OH	576	110%				101%
9	Daniels Park-Prairie #2 230	OH	576	109%				
10	Greenwood-Prairie # 1 230 kV	OH	576	119%				
11	Greenwood-Prairie # 2 230 kV	OH	576	100%				
12	Havana1-Chambers 115 N-0	OH	120	101%		104%	104%	104%
13	Havana1-Chambers 115	OH	120	101%		129%	123%	123%
14	Havana2-Chambers 115	OH	120		**127%**			
15	Arapahoe-Santa Fe 230	OH	319	103%				
16	Derby 2-Havana 115	OH	120	102%				
17	Waterton-WatertonTP 115	OH	127	136%				
18	Waterton-MartinTP 115	OH	138	108%				
19	Greeley-Godfrey	OH	120		**106%**	111%	108%	105%
20	WL_Child-Archer 230	OH	637	119%				
21	W.Canon-Hogback 115	OH	120	110%				
22	Lam_Co-Wilow_Ck 115	OH	107	124%				
23	LaJuntaW-RockyFrd 69	OH	23	116%				
24	FV-MidwayBR 115	OH						109%

[11] Hearing Exhibit 104, Direct Testimony and Attachments of Amanda R. King ("King Direct"), p. 57:7-10.

Q. DO THESE TRANSMISSION STUDIES OF BALANCED PORTFOIOS ALSO DEMONSTRATE THAT PSCO'S BENCHMARK CASE IS NOT VALID?

A. Yes. PSCo modeled a "benchmark case" on the existing transmission system, but PSCo injected capacity at only two locations: Pawnee and Comanche.[12] This concentrated injection resulted in many overloaded lines. The balanced portfolios demonstrate that by spreading out the injection across the entire system demonstrates that the existing transmission system can accommodate significant amounts of renewable capacity.

VII. CONCLUSION

Q. DOES THE EVIDENCE PRESENTED HERE DEMONSTRATE THAT THESTATEMENT "THAT NEW GENERATION WILL LIKELY COME ON OVER THE PERIOD OF LATE 2025 AND BEYOND" IS INCORRECT?

A. Yes. the statement "that new generation will likely come on over the period of late 2025 and beyond" is incorrect, or at the very least, incomplete. This evidence demonstrates, first, that developers have proposed thousands of megawatts of new renewable capacity for the 2022-2024 time period. Second, this evidence demonstrates that the addition of early renewable capacity can be accommodated on the existing transmission system. This perspective opens up for the Commission both the ability to add the necessary generation in 2025 and beyond, but also demonstrates that there is potential for new resources to be added now. This should be helpful to the Commission to broaden its perspective on the transmission potential for the state and how it decides the Company should add new resources.

Q. DOES THIS EVIDENCE DEMONSTRATE THAT MR. CAMP'S POSITION IN SUPPORT OF THE PATHWAYS PROJECT IS INCOMPLETE?

[12] King Direct, p. 43:1-3.

A. Yes. This evidence demonstrates that Mr. Camp's support "for development of the incremental transmission facilities that will be required to move the new clean energy from the generation source to the customer's loads" is incomplete. While Mr. Camp may be right about significant new resources beginning in 2025, it leaves out the significant potential on the system now. This has the negative effect that available resource potential may be overlooked in the present. It is my perspective that the Commission should be maximizing current potential and looking to the future as well. I recommend to the Commission to require the Company to incorporate current potential into its resource planning efforts in conjunction with forward looking transmission buildout.

Q. DOES THAT COMPLETE YOUR TESTIMONY?

A. Yes, it does.

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF COLORADO

PROCEEDING NO. 21A-0096E

IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF COLORADO FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR COLORADO'S POWER PATHWAY 345 KV TRANSMISSION PROJECT AND ASSOCIATED FINDINGS REGARDING NOISE AND MAGNETIC FIELD REASONABLENESS

AFFIDAVIT OF CHRIS NEIL

COMES NOW Chris Neil, of proper age and duly sworn, and states under penalty of perjury, that the foregoing Cross-Answer Testimony and Attachments on Behalf of the Office of the Utility Consumer Advocate were prepared by him or under his supervision and control, that they are true and correct to the best of his knowledge and belief, and would be the same if given orally under oath.

s/ Chris Neil
Chris Neil

October 22, 2021