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PUC DOCKET NO. 55067

DIRECT TESTIMONY OF HARSH NAIK, WITNESS FOR ONCOR ELECTRIC DELIVERY COMPANY LLC

I.	POSITION AND QUALIFICATIONS	2
II.	PURPOSE OF TESTIMONY	
III.	PROJECT DESCRIPTION AND DEVELOPMENT	4
IV.	NEED FOR THE PROPOSED TRANSMISSION LINE PROJECT	6
V.	ALTERNATIVES CONSIDERED	9
VI.	PLANNING CONSTRAINTS	15
VII.	CONCLUSION	18
	AFFIDAVIT	19

Exhibit HN-1 Resume of Harsh Naik

- Exhibit HN-2 ERCOT RPG Submittal: Roanoke Area Upgrades Project (February 2022)
- Exhibit HN-3 ERCOT Board of Directors Meeting Minutes (August 16, 2022)

PUC Docket No. 55067

1

1		DIRECT TESTIMONY OF HARSH NAIK
2		I. POSITION AND QUALIFICATIONS
3	Q.	PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.
4	Α.	My name is Harsh Naik. I am employed by Oncor Electric Delivery
5		Company LLC ("Oncor"). I hold the position of Senior Manager in Oncor's
6		Transmission Planning group. My business address is 777 Main Street,
7		Suite 707, Fort Worth, Texas 76102.
8	Q.	PLEASE DESCRIBE YOUR PROFESSIONAL QUALIFICATIONS.
9	Α.	I am a licensed professional engineer in the State of Texas (No. 139179)
10		with nearly a decade's experience in transmission planning and
11		engineering. I graduated with a Bachelor of Science degree in Electrical
12		Engineering from Texas A&M University in 2012 and have worked for Oncor
13		ever since. I am currently responsible for leading Oncor's transmission
14		planning group for the Dallas-Fort Worth ("DFW") Metroplex and the North
15		Region of Oncor's transmission system. I represent Oncor at the Electric
16		Reliability Council of Texas ("ERCOT") Regional Planning Group ("RPG")
17		and the ERCOT Planning Working Group.
18		My job duties include: leading Oncor's evaluation of long-range
19		transmission projects to resolve grid reliability issues; performing power flow
20		studies and analyses in accordance with North American Electric Reliability
21		Corporation ("NERC") reliability criteria and the ERCOT Planning Guide;
22		and supporting the development of Oncor's transmission projects through
23		the ERCOT and Public Utility Commission of Texas ("Commission")
24		approval processes. Currently, I am focused on Oncor's Roanoke Area
25		Upgrades Project, which includes the proposed Ramhorn Hill-Dunham 345
26		kV transmission line project (the "Proposed Transmission Line Project"). My
27		resume is included as Exhibit HN-1 to my direct testimony.
28	Q.	HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY BEFORE THE
29		PUBLIC UTILITY COMMISSION OF TEXAS ("COMMISSION")?
30	Α.	Yes. I submitted testimony in Docket Nos. 52455 and 54733.

PUC Docket No. 55067

1		II. PURPOSE OF TESTIMONY
2	Q.	WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?
З	Α.	The purpose of my direct testimony is to address certain aspects of the
4		Proposed Transmission Line Project, including:
5		 supporting the electrical need for the Proposed Transmission Line
6		Project;
7		 submissions to and recommendations from ERCOT regarding the
8		Proposed Transmission Line Project;
9		 the adequacy of existing service;
10		 the need for additional service;
11		 how the Proposed Transmission Line Project supports the reliability
12		and adequacy of the interconnected transmission system;
13		 how the Proposed Transmission Line Project supports robust
14		wholesale competition;
15		• the probable improvement of service or lowering of cost to
16		consumers in the area if the certificate of convenience and necessity
17		("CCN") is granted;
18		 the effect of granting the requested CCN on Oncor and any other
19		electric utility serving the proximate area; and
20		 presentation and comparison of alternatives to the Proposed
21		Transmission Line Project.
22		These issues are addressed in Oncor's responses to Question Nos. 14-16
23		in the Application for a Certificate of Convenience and Necessity for a
24		Proposed Transmission Line Project filed by Oncor in this docket (the
25		"Application"). The facts and statements set forth in Question Nos. 14-16
26		of the Application and Attachment Nos. 4-6 to the Application, which I
27		sponsor, are true and correct. The Application, as it may be amended
28		and/or supplemented, will be offered into evidence by Oncor at the hearing.

III. PROJECT DESCRIPTION AND DEVELOPMENT

2 Q. PLEASE GENERALLY DESCRIBE THE EXISTING TRANSMISSION3 SYSTEM IN THE AREA.

1

A. The Roanoke – Alliance area is one of the highest growth areas in the DFW
Metroplex. This area lies in ERCOT's North Central weather zone, just
north of Fort Worth, and includes portions of Tarrant, Denton, and Wise
counties. A map of the transmission system in this area is included as
Attachment No. 5 to the Application.

9 The rapid growth in this area is largely due to its location near: Dallas 10 and Fort Worth, two major commercial hubs; DFW International Airport, the 11 second busiest airport in the world by passenger traffic; and Alliance Airport, 12 a major hub for FedEx, Amazon, DHL, BNSF Railway and many other 13 commercial and industrial operations. That, in combination with Texas's 14 general population growth and the recent migration of many commercial 15 offices, warehouses, data centers, and corporate headquarters to the state, 16 has driven a rapid increase in electric demand in the Roanoke – Alliance 17 area.

18 The 345 kV transmission system in this area is part of a high-power 19 transfer corridor connecting generation in the Panhandle to the DFW load 20 center. The power transfer and load-serving capabilities of this system 21 depend on facilities developed as part of the Competitive Renewable 22 Energy Zone initiative, many of which are approaching their designed 23 operating limits at current demand levels. Continued growth in this area will 24 result in overloaded circuits during peak-load, post-contingency conditions 25 as early as the summer of 2023.

26 Q. PLEASE GENERALLY DESCRIBE THE NEED FOR THE ROANOKE27 AREA UPGRADES PROJECT.

A. To address existing congestion, overloading concerns, and potential for
 post-contingency thermal overloads and voltage criteria exceedances in the
 Roanoke – Alliance area, Oncor submitted the Roanoke Area Upgrades
 PUC Docket No. 55067 Naik – Direct

Oncor Electric Delivery Company LLC Ramhorn Hill-Dunham 345 kV CCN

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1 Project to ERCOT's RPG in February 2022. That submittal is included as 2 Exhibit HN-2 to my testimony. ERCOT conducted an independent review 3 and endorsed the Roanoke Area Upgrades Project in July 2022 as a Tier 1 4 transmission project that is critical to the reliability of the ERCOT grid. The 5 overall Roanoke Area Upgrades Project includes a series of transmission 6 rebuilds, upgrades, and new transmission construction that will address 7 reliability issues, increase load-serving capability, and provide operational 8 flexibility in the Roanoke – Alliance area.

9 The Roanoke Area Upgrades Project will improve reliability in the area 10 by establishing two new 345 kV switching stations and one new 345/138 kV 11 switching station, converting an existing 345 kV load-serving substation to 12 138 kV operation, constructing two new 345 kV transmission lines and three 13 new 138 kV lines, and rebuilding and/or upgrading two existing 345 kV 14 transmission line and two existing 138 kV transmission lines.

15 Q. WHAT IS THE STATUS OF THE ROANOKE AREA UPGRADES16 PROJECT?

A. As part of these upgrades, Oncor will seek Commission approval for thefollowing projects in separate CCN proceedings:

- 19 The Proposed Transmission Line Project; 20 The Keller Wall Price-Keller Magnolia 138 kV transmission line 21 project and Keller Wall Price-Roanoke 138 kV rebuild project, a 0.3-22 mile transmission line project that involves rebuilding an existing 23 Oncor transmission line segment, constructing a new segment of 24 transmission line, and establishing a new 138 kV switching station, 25 all in Tarrant County. Oncor filed an application for this CCN in 26 Docket No. 54733;
 - The Exchange-Keller Magnolia 138 kV transmission line project, a
 new, approximately 1.5-mile, 138 kV double-circuit transmission line
 in northeast Tarrant County; and

The Exchange-Roanoke 345/138 kV transmission line project, which
 includes rebuilding the existing Exchange-Roanoke 345 kV double circuit transmission line on double-monopole structures. One
 monopole will accommodate an existing 345 kV circuit and a new
 138 kV circuit, and the second monopole will accommodate the
 second existing 345 kV circuit and include a vacant circuit position
 for a future 138 kV circuit.

8 Q. PLEASE DESCRIBE THE PROPOSED TRANSMISSION LINE PROJECT. 9 Α. The Ramhorn Hill-Dunham 345 kV transmission line project includes 10 establishing (1) the proposed Ramhorn Hill 345 kV switching station in Wise 11 County, which will tap into the existing Hicks-Willow Creek 345 kV 12 transmission line, and (2) the proposed Dunham Switch in Denton County, 13 which will tap into the existing Lewisville-Krum West and Lewisville-14 Roanoke 345 kV transmission lines. Those stations will be connected by 15 an approximately 20-23 mile double-circuit 345 kV transmission line, which 16 will be built on triple-circuit capable monopole structures to allow for future 17 138 kV underbuild.

18

IV. NEED FOR THE PROPOSED TRANSMISSION LINE PROJECT

Q. PLEASE PROVIDE AN OVERVIEW OF THE NEED FOR THE PROPOSED
 TRANSMISSION LINE PROJECT.

21 Α. The Proposed Transmission Line Project is part of Oncor's Roanoke Area 22 Upgrades Project, which is needed to prevent future thermal overloads and 23 voltage criteria exceedances driven by load growth that is straining the 24 existing transmission system. While Texas is experiencing significant load 25 growth statewide, this is especially true of the Roanoke - Alliance area. 26 Load growth in this area is driven by several key factors, including: (1) 27 commercial and industrial loads seeking placement near Alliance Airport; 28 (2) the expansion of existing residential and commercial development; and 29 (3) large, planned developments locating on the remaining vacant land in 30 the area. These conditions attract substantial residential, commercial, and PUC Docket No. 55067 Naik – Direct Oncor Electric Delivery Company LLC

industrial development, which are straining the existing transmission
 system.

3 System limitations in this area are restricting the further development 4 of large point loads in the area. Limitations on available capacity are 5 currently requiring large-load customers to either modify their load ramps, 6 adjust their business plans, or choose to locate elsewhere. Over the last 7 18 months, Oncor has been limited in fulfilling or unable to fulfill several 8 requests for service due to potential autotransformer and line overloads. 9 The Roanoke Area Upgrades Project, including the Proposed Transmission 10 Line Project, will help address these constraints.

11 Q.HAS ERCOT REVIEWED THE NEED FOR THE PROPOSED12TRANSMISSION LINE PROJECT?

13 Yes. Oncor provided its Roanoke Area Upgrades Project submittal to the Α. 14 ERCOT RPG in February 2022. ERCOT conducted an independent review 15 of the Roanoke Area Upgrades Project in July 2022 and recommended an 16 option that includes the Proposed Transmission Line Project. A copy of 17 Oncor's submittal to ERCOT RPG is attached to my testimony as Exhibit 18 HN-2, and ERCOT's independent review is included as Attachment No. 4 19 to the Application. At a meeting held on August 16, 2022, ERCOT's Board 20 of Directors endorsed the Roanoke Area Upgrades Project, including the 21 Proposed Transmission Line Project, as a Tier 1 project that is critical to 22 reliability of the ERCOT system. The minutes from that meeting are 23 included as Exhibit HN-3 to my direct testimony.

24Q.HOW WOULD THE PROPOSED TRANSMISSION LINE PROJECT25IMPROVE RELIABILITY IN THE STUDY AREA?

A. The system limitations previously discussed raise concerns for transmission
 reliability in the area. Both Oncor's and ERCOT's steady state contingency
 analyses conducted through power flow studies show that thermal
 overloads and voltage violations would occur under certain contingencies
 studied under NERC Reliability Standard TPL-001-4 and the ERCOT
 PUC Docket No. 55067
 Naik – Direct
 Oncor Electric Delivery Company LLC

Ramhorn Hill-Dunham 345 kV CCN

Planning Guide. Oncor's steady-state assessment showed thermal
 overload reliability issues in post-contingency conditions for eight area
 transmission elements and voltage criteria exceedances on twelve buses
 on the Roanoke-Deen 138 kV transmission line, which serves almost 1,000
 MW of load in the Roanoke – Alliance area.

6 ERCOT's steady-state analysis observed overloading on ten 7 transmission elements under P1, P3, and P6 contingencies, with loading 8 ranging between 100.00% and 117.27% of those elements' rated thermal 9 capacities. ERCOT's steady state analysis also observed five voltage 10 criteria exceedances under P1, P3, and P6 contingencies.

11 The Roanoke Area Upgrades Project, including the Proposed 12 Transmission Line Project, will address these reliability criteria violations 13 while improving system capabilities by increasing transmission capacity and 14 providing additional operational flexibility in the Roanoke – Alliance area. 15 Among the four alternatives studied, ERCOT concluded that the Roanoke 16 Area Upgrades Project provides the best long-term load serving capability, 17 better operational flexibility during transformer prior outage conditions, and 18 better flexibility for future utilization associated with transmission between 19 Oncor's Exchange and Roanoke stations.

20 Q. WHAT WERE THE RESULTS OF ERCOT'S INDEPENDENT REVIEW
21 FOR THE PROPOSED TRANSMISSION LINE PROJECT?

A. ERCOT endorsed the Roanoke Area Upgrades Project and designated it
 as critical to the reliability of the ERCOT transmission system pursuant to
 16 Texas Administrative Code ("TAC") § 25.101(b)(3)(D). It is my
 understanding that 16 TAC § 25.101(b)(3)(A) requires the Commission to
 give great weight to ERCOT's endorsement of the Proposed Transmission
 Line Project.

28 Q. DOES THE PROPOSED TRANSMISSION LINE PROJECT FACILITATE29 ROBUST WHOLESALE COMPETITION?

1 Α. Yes. The Proposed Transmission Line Project will facilitate robust 2 wholesale competition by facilitating the delivery of economical electric 3 power at 345 and 138 kV from existing and future generation resources in 4 the Panhandle to existing and future electric customers in the rapidly 5 growing DFW load center. DOES THE PROPOSED TRANSMISSION LINE PROJECT FOSTER 6 Q. 7 COMPETITION IN THE RETAIL MARKET? 8 Α. Yes. The Proposed Transmission Line Project will foster competition in the 9 retail market by improving transmission service in an area where retail 10 competition is available. 11 WILL THE PROPOSED TRANSMISSION LINE PROJECT AFFECT ANY Q. 12 OTHER ELECTRIC UTILITIES IN THE AREA? No. The Proposed Transmission Line Project would not serve or connect 13 Α. 14 into another electric utility. However, all utilities operating in the area will 15 benefit from the increased system reliability resulting from the Roanoke 16 Area Upgrades Project. 17 V. ALTERNATIVES CONSIDERED 18 WHAT ALTERNATIVES TO THE PROPOSED TRANSMISSION LINE Q. 19 PROJECT WERE STUDIED? 20 Α. Oncor initially studied three alternatives to resolve the identified reliability 21 issues. The Proposed Transmission Line Project was included in two of the 22 three alternatives. Option #1 is the alternative that Oncor proposed in its 23 submittal to the ERCOT RPG. The components of the three alternatives 24 are listed below: 25 Oncor Option #1: 26 Establish the Exchange 345/138 kV Switching Station, adjacent to • 27 Alliance 345 kV Substation, with two 600 MVA autotransformers in a 28 8-breaker 345 kV breaker-and-a-half bus arrangement and a 9-29 breaker 138 kV breaker-and-a-half arrangement

1	Convert the existing Alliance 345 kV load-serving substation to 138
2	kV operation
3	 Establish the Exchange – Keller Wall Price 138 kV double-circuit line
4	using a conductor rated at least 3121 A or greater with the following
5	upgrades:
6	Construct the Exchange – Keller Magnolia 138 kV double-
7	circuit line
8	Upgrade the Keller Magnolia – Keller Wall Price Switch 138
9	kV line using double-circuit capable structures
10	 Establish a new 138 kV switching station at Keller Wall Price
11	in a 6-breaker ring bus arrangement
12	 Disconnect the Keller Magnolia Tap – Heritage/Keller
13	Magnolia line at Keller Magnolia Tap and terminate at Keller
14	Wall Price by constructing a new 0.3-mile double-circuit 138
15	kV transmission line
16	 Establish the Ramhorn Hill 345 kV switching station in a 10-breaker,
17	breaker-and-a-half arrangement
18	• Establish Dunham 345 kV switching station with in a 10-breaker,
19	breaker-and-a-half arrangement
20	Construct an estimated 18.4-mile triple-circuit line between Ramhorn
21	Hill and Dunham with:
22	 Two 345 kV circuits using conductor rated at least 5000 A
23	A vacant position for a future 138 kV circuit to support future
24	load serving substations in growth areas
25	Rebuild Exchange – Roanoke 345 kV double-circuit line using
26	separate double-circuit capable structures for each line with
27	conductor rated at least 5000 A and establish the Exchange –
28	Roanoke 138 kV circuit using one of the Exchange – Roanoke 345
29	kV line double-circuit capable structures rated at least 3200 A
	BUC Decket No. 55067 Noik Direct

1		• Ensure all new 345 kV terminals at Exchange, Ramhorn Hill, and
2		Dunham are rated 5000 A and 138 kV terminals at Exchange, Keller
3		Wall Price, and Roanoke are rated 3200 A
4		Oncor Option #2:
5		• Establish Dunham 345 kV switching station in an 8-breaker, breaker-
6		and-a-half arrangement
7		• Establish Dunham 138 kV switching station in a 5-breaker, breaker-
8		and-a-half arrangement
9		• Establish two new 345/138 kV autotransformers at the proposed
10		Dunham 345 kV switching station
11		Construct an estimated 1-mile, 138 kV double-circuit line from
12		Dunham to Cross Timbers with conductor rated 3200 A or greater
13		Oncor Option #3:
14		 Establish the Ramhorn Hill 345 kV switching station in a 10-breaker,
15		breaker-and-a-half arrangement
16		 Establish Dunham 345 kV switching station in an 11-breaker,
17		breaker-and-a-half arrangement
18		Construct an estimated 18.4-mile, 345 kV double-circuit line from
19		Ramhorn Hill to Dunham with conductor rated 5000 A or greater
20		Establish Dunham 138 kV switching station in a 5-breaker, breaker-
21		and-a-half arrangement
22		• Establish two new 345/138 kV autotransformers at the proposed
23		Dunham 345 kV switching station
24		Construct an estimated 1-mile, 138 kV double-circuit line from
25		Dunham to Cross Timbers with conductor rated 3200 A or greater.
26	Q.	WHY DID ONCOR PROPOSE OPTION #1 RATHER THAN OPTION #2
27		OR OPTION #3 TO THE ERCOT RPG?
28	Α.	While both Option #2 and Option #3 reduced some post-contingency
29		thermal overloads, Option #1 most effectively addressed thermal
	PUC	Docket No. 55067 Naik – Direct

overloading across all case years studied. Option #1 also resolved load serving limitations and voltage criteria exceedances on the Roanoke –
 Euless/Deen double-circuit transmission lines, whereas Options #2 and #3
 did not. Therefore, Oncor recommended Option #1 to ERCOT as the option
 that best addressed the identified reliability issues.

6 Q. PLEASE DESCRIBE THE ALTERNATIVES EVALUATED BY ERCOT.

A. ERCOT developed and evaluated four system improvement options to
 resolve the thermal overloads and voltage violations discovered in its
 analysis. The Proposed Transmission Line Project was a component of
 three of the four options studied. Table 1 below shows the transmission
 upgrades included in each of the four alternatives studied by ERCOT.

12

Transmission Upgrade	Approximate Length of	Normal / Emergency		Opti	ons	
	Transmission Line (miles)	Rating (MVA)	1	21	3	4
Construct a new Ramhorn Hill 345-kV switching station in a 10- breaker breaker-and-a-half arrangement tapped into existing double-circuit Hicks to Willow Creek 345-kV lines				~	~	~
Construct a new Dunham 345-kV switching station in a 10-breaker breaker-and-a-half arrangement tapped into existing Lewisville to Krum West and Lewisville to Roanoke 345-kV lines				~	~	~
Construct two new Ramhorn Hill to Dunham 345-kV transmission lines, with conductor rated to at least 2987 MVA, in a new (estimated 18.4-mile) right-of-way installed on new triple-circuit towers leaving one 138-kV vacant position	18.4	2987/2987		~	~	~
Upgrade Hicks to Exchange 345-kV double-circuit line with conductors rated to at least 2987 MVA	5.8	2987/2987	~			
Rebuild Exchange to Roanoke 345-kV double-circuit lines, upgrading both with conductors rated to at least 2987 MVA, using separate double-circuit capable structures for each line	3.6	1912/1912 ²		~		
Construct a new Exchange to Roanoke 138-kV circuit, with conductor rated to at least 764 MVA, using one of the Exchange to Roanoke 345-kV line double-circuit capable structures	3.8	764/764		~		
Upgrade Exchange to Roanoke 345-kV double-circuit lines with conductor rating to at least 2987 MVA	3.6	1912/1912 ²	~		~	

¹ ERCOT's Option 2 is substantially the same as Oncor's Option #1, the option Oncor recommended after its internal review.

² Exchange to Roanoke 345-kV conductor will be capable of 2987/2987 MVA, however terminal equipment at Roanoke will limit the line ratings to 1912/1912 MVA.

PUC Docket No. 55067

Naik – Direct Oncor Electric Delivery Company LLC Ramhorn Hill-Dunham 345 kV CCN

Construct a new Exchange 345/138-kV Switching Station, adjacent to Alliance 345-kV substation, with two new 600 MVA transformers (nameplate) in an 8-breaker 345-kV breaker-and-a-half bus arrangement and a 9-breaker 138-kV breaker-and-a-half arrangement		700/750	~	~	~	~
Convert the existing Alliance 345-kV load serving substation to 138- kV load serving operation			~	~	~	~
Construct a new Exchange to Alliance 138-kV double-circuit line with conductors rated to at least 746 MVA	0.1	746/746	~	~	~	~
Construct a new Alliance to Keller Magnolia and Alliance to Heritage 138-kV double-circuit line with conductors rated to at least 746 MVA	1.4 Keller Magnolia	746/746	~	~	~	~
Upgrade the existing Keller Magnolia to Heritage 138-kV line with conductor rated to at least 746 MVA to be installed on the Alliance to Keller Magnolia and Alliance to Heritage 138-kV double-circuit towers	1.0	746/746	~	~	~	~
Upgrade the existing Heritage to Keller Magnolia Tap double-circuit lines with conductors rated to at least 746 MVA	1.3	746/746	~	~	~	~
Construct a new 138-kV switching station at Keller Wall Price in a 6- breaker ring bus arrangement			~	>	~	~
Disconnect the double-circuit Heritage to Keller Magnolia Tap lines at Keller Magnolia Tap and terminate both at Keller Wall Price by constructing two new 0.3-mile 138-kV transmission lines added to the existing Keller Magnolia Tap to Keller Wall Price right-of-way with both new line conductors rated to at least 746 MVA	0.3	746/746	~	~	~	~
Retire the Keller Magnolia Tap			~	~	~	~

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- 2

Table 1: Transmission Alternatives Studied by ERCOT

Q. HOW DID ERCOT ANALYZE THE FOUR OPTIONS?

3 Α. ERCOT performed reliability assessments on the four options based on 4 NERC Reliability Standard TPL-001-4, the applicable ERCOT Nodal 5 Protocols, and Planning Criteria. ERCOT performed a planned 6 maintenance outage analysis, including an N-1-1 contingency analysis, and 7 a long-term load serving capability analysis. Based on these analyses, 8 ERCOT short-listed Options 2, 3, and 4, all of which include the Proposed 9 Transmission Line Project. Option 1 was eliminated from consideration 10 because it did not fully resolve the thermal overloading. ERCOT created 11 cost estimates for the three short-listed options. The estimated cost of 12 Option 2 was \$286 million, the estimated cost of Option 3 was \$264 million, 13 and the estimated cost of Option 4 was \$254 million.

14 To estimate and compare the long-term load serving capabilities of the 15 three short-listed options, ERCOT adjusted load-up in the substations in the

1 Roanoke area in Oncor's submittal to ERCOT RPG. To balance power, 2 ERCOT adjusted down conforming load outside of the North Central 3 weather zone and simulated N-1 contingencies. As a result of this analysis, 4 ERCOT recommended Option 2 (the Roanoke Area Upgrades Project). 5 Q. WHY DID ERCOT SELECT OPTION 2 AS ITS PREFERRED OPTION? 6 While all of the short-listed options addressed the identified reliability criteria 7 violations, ERCOT concluded that Option 2 was the most effective solution 8 because it provides the following benefits: 9 Better long-term load-serving capability; 10 Better operational flexibility during transformer prior outage 11 conditions: 12 Elimination of 345 kV (P7) double-circuit contingency associated with 13 transmission between Exchange and Roanoke; and 14 Better flexibility for future utilization associated with transmission 15 between Exchange and Roanoke. 16 ERCOT's analysis revealed that all three short-listed options would need to 17 address six 138 kV and one 345 kV thermal overloads in order to increase 18 long-term load-serving capability in the area. However, Options 3 and 4 19 would require additional major transmission improvements to address 20 overloading on the two existing 345/138 kV transformers at Roanoke, 21 whereas no additional system improvements were required under Option 2. 22 Because Option 2 resolved the identified issues without the need for 23 additional major transmission improvements, ERCOT selected Option 2 as 24 the superior option. 25 DID ONCOR CONSIDER THE USE OF 500 KV CIRCUITS FOR THE Q. 26 PROPOSED TRANSMISSION LINE PROJECT? 27 Α. Yes, Oncor considered using 500 kV circuits but determined they should 28 not be used for this project. Although Oncor has the ability to build and 29 accommodate future 500 kV circuits, such construction is better

implemented in the context of an overall master plan, which ERCOT will
 need to adopt. While Oncor previously conducted studies regarding the
 potential use of 500 kV circuits to address specific needs in the West Texas
 area, an additional study would be necessary to address more widespread
 use of 500 kV circuits on the ERCOT system.

6 Q. WOULD A DISTRIBUTION ALTERNATIVE TO THE PROPOSED7 TRANSMISSION LINE PROJECT BE FEASIBLE?

A. No. Distribution alternatives to the Proposed Transmission Line Project are
 not feasible since they would not improve the reliability and operational
 capability of the transmission system in the area, cannot adequately serve
 the rapidly growing load in being served from the transmission system in
 the Roanoke – Alliance area, and cannot meet power quality requirements
 in the area.

14 Q. WOULD VOLTAGE UPGRADES, CONDUCTOR BUNDLING, OR
 15 ADDITIONAL TRANSFORMERS PRESENT VIABLE ALTERNATIVES TO
 16 THE PROPOSED TRANSMISSION LINE PROJECT?

A. No. Upgrading the voltage of existing facilities, bundling of conductors, and
adding transformers would not resolve the reliability issues noted above.
Likewise, these types of alternatives would not provide the necessary level
of service to meet electric demand in the Roanoke – Alliance area.

VI. <u>PLANNING CONSTRAINTS</u>

22 Q. HOW DID PLANNING CONSTRAINTS IMPACT THE LOCATIONS OF
 23 THE PROJECT'S ENDPOINTS?

A. ERCOT's endorsement of the Roanoke Area Upgrades Project specifies
 that the Dunham Switch will tap into the Lewisville-Krum West/Roanoke 345
 kV transmission lines and that the Ramhorn Hill Switch will tap into the
 Hicks-Willow Creek 345 kV transmission line. It was, therefore, crucial that
 the switching stations be located in proximity to these transmission lines.

29 Q. DID ONCOR CONSIDER ANY OTHER ENDPOINT LOCATIONS FOR

30 THE PROPOSED TRANSMISSION LINE PROJECT?

PUC Docket No. 55067

21

A. Yes. Oncor reviewed potential alternate locations for the Dunham Switch
 along the Lewisville-Krum West/Roanoke transmission line corridor.
 However, due to the presence of other constraints in the study area, the
 alternatives were all located further east and would have extended the
 length of the transmission line without providing any electrical benefit.

6 Q. WHAT STEPS DID ONCOR TAKE TO ENSURE THE PROPERTY FOR7 THE STATIONS WOULD BE AVAILABLE WHEN NEEDED?

8 Α. Oncor's planning group identified the high growth and potential for reliability 9 issues in this area and, in 2021, acquired a property adjacent to the 10 Lewisville-Krum West/Roanoke transmission lines in anticipation of the 11 future need for a new switching station in this general location. Oncor 12 routinely makes advance purchases of properties for future use that would 13 be difficult if not impossible to obtain, especially in an economical manner, 14 if the purchases were deferred. When acquiring property for a new 15 switching station, Oncor must obtain fifty or more contiguous acres of land. 16 Moreover, the station property must be located in proximity to the demand 17 for power and account for existing transmission facilities and topology, 18 which often places it in high-growth areas where large tracts of land are 19 increasingly difficult to acquire. If Oncor did not acquire such properties in 20 a timely manner, they may not be available when needed or would likely be 21 available only at substantially higher prices.

In the case of the Dunham Switch, Oncor acquired the property just before the surrounding land was approved for a massive residential, commercial, and recreational development that will bring 20,000 new homes and hundreds of new businesses to the area surrounding the existing Lewisville-Krum West/Roanoke transmission lines.

Similarly, Oncor acquired the site for the Ramhorn Hill Switch in 2021
 in anticipation of the future need for a switching station in this general
 location. That station site is adjacent to Oncor's existing Hicks-Willow
 Creek 345 kV transmission line, and will tap into that transmission line and
 PUC Docket No. 55067
 Naik – Direct
 Oncor Electric Delivery Company LLC
 Ramhorn Hill-Dunham 345 kV CCN

include vacant terminals to accommodate future transmission lines to
provide service to the area to the north, where new development is quickly
expanding into rural areas. Like the area surrounding the Dunham Switch
station site, the vicinity surrounding the Ramhorn Hill Switch station site is
a rural/exurban area that will soon be the location of a new 3,700-acre
residential and commercial development.

7 8 Q.

DID ANY PLANNING CONSTRAINTS IMPACT THE ROUTING OF THE TRANSMISSION LINE?

9 Yes. Prior to filing the Application, Oncor coordinated with the USACE and Α. 10 municipal officials to determine whether routing through the USACE 11 property located south and west of the proposed Dunham Switch station 12 site might be feasible. This coordination is addressed primarily in the direct 13 testimony of Oncor witnesses Mr. Russell Marusak and Ms. Amy L. 14 Zapletal. However, my testimony will address the planning constraints that 15 limited Oncor's ability to use one of the designated utility corridors ("Corridor 16 11") to cross the USACE property.

17 Q. WHAT PLANNING CONSTRAINTS WOULD BE IMPLICATED BY18 ONCOR'S POTENTIAL USE OF UTILITY CORRIDOR 11?

19 Corridor 11 runs generally north to south across the USACE property and Α. 20 is currently occupied by four high-voltage transmission circuits, including 21 two Oncor/Texas Municipal Power Agency 345 kV circuits and two Brazos 22 Electric Power Cooperative 138 kV circuits. Since the Proposed 23 Transmission Line Project will eventually include two 345 kV circuits and 24 one 138 KV circuit, routing the Proposed Transmission Line Project through 25 Corridor 11 would place seven high-voltage transmission circuits in a single 26 corridor. With this many circuits in such close proximity, a single event (e.g., 27 a tornado, downed tree, or structure failure) could cause the loss of all 28 seven circuits, which would be tremendously detrimental for power flow in 29 this area and for the ERCOT transmission grid as a whole. Moreover, 30 placing seven circuits in the same right-of-way would make access and PUC Docket No. 55067 Naik – Direct **Oncor Electric Delivery Company LLC**

Ramhorn Hill-Dunham 345 kV CCN

maintenance difficult, resulting in longer outages, increased reliability risks,
a significant risk of lost load for consumers, and higher maintenance costs.
For these reasons, the use of Corridor 11 poses an unacceptable reliability
risk. Oncor witness Ms. Zapletal and Mr. Marusak address the engineering
and routing issues associated with potential utilization of the USACE
property for routing the Proposed Transmission Line Project.

7

VII. CONCLUSION

8 Q. ARE THE PROPOSED FACILITIES NECESSARY FOR THE SERVICE,
9 ACCOMMODATION, CONVENIENCE, OR SAFETY OF THE PUBLIC
10 WITHIN THE MEANING OF PURA SECTION 37.056(A), TAKING INTO
11 ACCOUNT THE FACTORS SET OUT IN PURA SECTION 37.056(C)?

A. Yes. Existing transmission service in the project area is inadequate, and
 the additional service provided by the Proposed Transmission Line Project
 is needed to support the reliability and adequacy of the interconnected
 transmission system.

16 Q. PLEASE SUMMARIZE YOUR TESTIMONY.

17 Α. The Proposed Transmission Line Project is needed to address critical 18 reliability issues by resolving thermal overloads, line-loading limitations, and 19 criteria resulting voltage exceedances from aging transmission 20 infrastructure and high load growth in an area of rapid residential, 21 commercial, and industrial development. When compared with the other 22 feasible alternatives that were studied, the Proposed Transmission Line 23 Project provides the best solution for addressing these issues, which led 24 ERCOT to endorse this project as a Tier 1 transmission project that is critical 25 to the reliability of the ERCOT grid. The locations of the endpoints and the 26 transmission line routing for the Proposed Transmission Line Project were 27 guided by Oncor's planning criteria, Oncor's routing policies, and the 28 reliability needs of the ERCOT system.

29 Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

30 A. Yes.

PUC Docket No. 55067

AFFIDAVIT

STATE OF TEXAS § SCOUNTY OF DALLAS §

BEFORE ME, the undersigned authority, on this day personally appeared Harsh Naik who, having been placed under oath by me, did depose as follows:

My name is Harsh Naik. I am of legal age and a resident of the State of Texas. The foregoing testimony and exhibits offered by me are true and correct, and the opinions stated therein are, to the best of my knowledge and belief, accurate, true and correct.

Harsh Naik

SUBSCRIBED AND SWORN TO BEFORE ME on this 5^{+1} day of June,

2023.



Notary Public, State of Texas

My Commission Expires

06-30-2026

PUC Docket No. 55067

Naik – Direct Oncor Electric Delivery Company LLC Ramhorn Hill-Dunham 345 kV CCN

HARSH NAIK, P.E.

Email: Harsh.Naik@oncor.com| Work Phone: 817-215-6771

Experience

SENIOR MANAGER | TRANSMISSION PLANNING | JULY 2022 - PRESENT

- Lead evaluation and recommendation of long-range transmission projects to resolve grid reliability issues
- Coordinate with the internal and external stakeholders to ensure efficient and effective transmission planning
- Lead power flow studies for new Point of Interconnection (POI) and Point of Delivery (POD)
- Lead development of power flow models
- Provide guidance and mentorship to team members to support their professional development
- Represent Oncor at ERCOT Regional Planning Group (RPG) and Planning Working Group (PLWG)

CONSULTING ENGINEER | TRANSMISSION PLANNING | FEB 2014 – JULY 2022

- Performed power flow studies to assess adequacy of transmission system in accordance with NERC reliability criteria and ERCOT Planning Guide
- Collaborated with internal and external stakeholders including with Transmission Engineering, Transmission PMO, Transmission Operations, Construction Management, and ERCOT to develop and implement transmission system upgrades
- Lead the coordination between ERCOT and Oncor in development of ERCOT's Regional Transmission Plan

ASSOCIATE ENGINEER | TRANSMISSION & SUBSTATION STANDARDS | MAY 2012 - FEB 2014

- Collaborated in an EPRI project that developed condition assessment and risk mitigation algorithm to evaluate performance of power transformers
- Assisted on a pilot project to evaluate dynamic line rating (DLR) technologies for transmission lines
- Participated in IEEE Power and Energy Society Substation Committee's Oil Containment working group and Community Acceptance working group

Licensure

TEXAS BOARD OF PROFESSIONAL ENGINEERS

License #: 139179

Education

BACHELOR OF SCIENCE | MAY 2012 | TEXAS A&M UNIVERSITY, COLLEGE STATION, TX

Major: Electrical Engineering

Skills

- Transmission Planning Studies
- System Modeling and Analysis
- Power Flow Analysis
- Transmission System Operations
- Prioritization/Time Management

- Project Management
- Strong Verbal and Written Communication Skills
- PSSE (Power System Simulator for Engineering)
- Power World
- Python

ROANOKE AREA UPGRADES

ERCOT RPG Submittal February 10, 2022

Business and Operations Services Assets Planning



Table of Contents

Executive Summary	3
Introduction	5
Purpose and Necessity	13
Planning Analysis	13
Steady State Analysis	
Dynamic Analysis	
Short-Circuit Study	
Subsynchronous Resonance (SSR) Screening	
Project Description	
One-Line Diagram	19
Alternative Solutions Tested	
Recommendation	24

2

Executive Summary

The north Fort Worth/Roanoke – Alliance area is one of the highest growth areas in the DFW Metroplex region, and the City of Roanoke has been one of the top 10 fastest growing communities in the DFW Metroplex for 3 straight years.¹ Oncor is addressing the extraordinary growth in electricity demand in this area with this Tier I project proposal. The **Roanoke Area Upgrades** proposal is a \$285.9M set of projects including three new 345 kV switching stations, two new 138 kV switching stations and approximately 28 miles of associated transmission lines, with an in-service date of May 2025. Three new transmission lines included in this proposal will require applications for amendments to Oncor's Certificate of Convenience and Necessity (CCN).

Oncor proposes the following:

- Establish the Exchange 345/138 kV Switching Station, adjacent to Alliance 345 kV Substation, with two 600 MVA Autotransformers in a 8-breaker 345 kV breaker-and-a-half bus arrangement and a 9-breaker 138 kV breaker-and-a-half arrangement
- Convert the existing Alliance 345 kV load serving substation to 138 kV operation
- Establish the Exchange Keller Wall Price 138 kV double-circuit line using a conductor rated at least 3121 A or greater with the following upgrades:
 - a. Construct the Exchange Keller Magnolia 138 kV double-circuit line
 - b. Upgrade the Keller Magnolia Keller Wall Price Switch 138 kV line using double-circuit capable structures
 - c. Establish a new 138 kV switching station at Keller Wall Price in a 6-breaker ring bus arrangement
 - Disconnect the Keller Magnolia Tap Heritage/Keller Magnolia line at Keller Magnolia Tap and terminate at Keller Wall Price by constructing a new 0.3-mile double-circuit 138 kV transmission line
- Establish the Ramhorn Hill 345 kV switching station in a 10-breaker breaker-and-a-half arrangement
- Establish Dunham 345 kV switching station with in a 10-breaker breaker-and-a-half arrangement
- Construct an estimated 18.4-mile triple-circuit line between Ramhorn Hill and Dunham with:
 - a. Two 345 kV circuits using conductor rated at least 5000 A
 - A vacant position for a future 138 kV circuit to support future load serving substations in growth areas
- Rebuild Exchange Roanoke 345 kV double-circuit line using separate double-circuit capable structures for each line with conductor rated at least 5000 A and establish the Exchange – Roanoke 138 kV circuit using one of the Exchange – Roanoke 345 kV line double-circuit capable structures rated at least 3200 A
- Ensure all new 345 kV terminals at Exchange, Ramhorn Hill, and Dunham are rated 5000 A and 138 kV terminals at Exchange, Keller Wall Price, and Roanoke are rated 3200 A

23

¹ "Economic Development", Roanoke Texas, accessed January 03, 2022, https://roanoketexas.com/138/Economic-Development

 The proposed project will require applications for Certificate of Convenience and Necessity (CCN) for the Exchange – Keller Wall Price 138 kV double-circuit line, the Ramhorn Hill – Dunham 345 kV doublecircuit line, and the Exchange – Roanoke 138 kV line.

The Roanoke area, which is approximately 15 miles north of Fort Worth, does not have sufficient existing transmission capacity to support the demands in the area due to the following key drivers:

- Sustained high load growth due to suburban, residential, and commercial expansion
- High load growth due to multiple high-load data centers planned in the area
- High transmission capacity utilization due to this area being a primary power transfer path from Panhandle area solar and wind farms to DFW area loads including the high growth area of North Dallas

Current demand forecasts indicate post contingency overloaded circuits under peak load conditions in the Roanoke area as early as summer 2023. Due to the long lead-time of CCN projects and the likelihood of grid constraints resulting from necessary construction outages, these overloads may occur as much as two years prior to the entire project completion. Constraint Management Plans, such as line-sectionalizing and/or load-shed schemes, may be necessary to mitigate any line overloads during this approximately two-year period.

Oncor submits this project proposal to the RPG review process with a formal request for ERCOT to designate the Roanoke Area Upgrade project set as Critical to the reliability of the ERCOT system. Timely review by ERCOT in conducting its independent assessment will allow Oncor to certify and build the needed transmission upgrades by the May 2025 in-service date, while limiting the duration of any necessary Constraint Management Plans. Pursuant to ERCOT Planning Guide Section 3.1.4.2(1), Oncor further respectfully requests ERCOT to use the findings from the 2021 Regional Transmission Plan (RTP) to serve as the ERCOT Independent Review of the proposed project.

Introduction

This submittal describes the need to establish the Ramhorn and Dunham 345 kV switching stations, establish the Exchange 345/138 kV switching station, establish the Keller Wall Price 138 kV switching station, construct an estimated 18.4-mile Ramhorn Hill – Dunham 345/138 kV triple-circuit capable line, establish the Exchange – Keller Wall Price Switch 138 kV double-circuit line, and establish the Exchange – Roanoke 138 kV circuit. The existing 345 kV transmission lines and autotransformers northwest of the Dallas-Fort Worth Metroplex serve an area of significant load growth and a major transfer path for the region. Figures 1 and 2 below show the approximate location and current configuration of the Roanoke area.



Figure 1 - Existing Roanoke Area Map

5



Figure 2 - Roanoke Area Existing Configuration (Partial)

6



Figure 3 – Proposed Upgrades (Option #1) One-Line

Project Description - Option #1

Oncor proposes the \$285.9M Roanoke Area Upgrades project set as a Tier 1 project that includes:

- Establish the Exchange 345/138 kV Switching Station with two 600 MVA Autotransformers
- Establish the Ramhorn Hill 345 kV switching station
- Establish the Dunham 345 kV switching station
- Construct an estimated 18.4-mile triple-circuit line between Ramhorn Hill and Dunham with two 345 kV circuits, and one vacant position for a future 138 kV circuit to support future load serving substations in growth areas (CCN required)
- Convert the existing Alliance 345 kV load serving substation to 138 kV operation
- Establish a new 138 kV switching station at Keller Wall Price
- Extend the Keller Magnolia Keller Wall Price 138 kV double-circuit line into the newly established Exchange Switch (CCN required)
- Establish the Exchange Roanoke 138 kV circuit by rebuilding Exchange Roanoke 345 kV doublecircuit line using separate double-circuit capable structures (CCN required)

Upon completion of the project, the resulting infrastructure in the Roanoke area is depicted in Figure 3.

Area Load Growth Description

The north Fort Worth/Roanoke – Alliance area is one of the highest growth areas in the DFW Metro region, and the City of Roanoke has been one of the top 10 fastest growing communities in the DFW area for 3 straight years.² Load growth is expected to continue in this area due to the following key drivers:

- Industrial loads seeking placement near Alliance Airport, the world's first industrial airport³
- Residential and commercial growth is increasingly expanding into this area as neighboring cities are becoming essentially built-out (as depicted in Figure 4)
- · Much of the remaining undeveloped land in the area is currently slated for large planned developments



Figure 4 – Land Development in the area of the proposed projects over the last decade

The coincident peak load between 2017 and 2020 in the Roanoke area has grown at an annual rate of ~3.1%, which is about double the ~1.4% annual growth rate of the overall Oncor coincident peak during this same period.

8

² "Economic Development", Roanoke Texas, accessed January 03, 2022, https://roanoketexas.com/138/Economic-Development

³ "History", Fort Worth Alliance Airport, accessed January 03,2022, https://www.allianceairport.com/about-us/history

This substantial and sustained load growth is expected to continue throughout the current planning horizon. This is due to the proximity to key transportation hubs that attract commercial and industrial development that, in turn, invite a strong employment base that requires supporting residential and community development. In addition to a major Interstate Highway and other roadway/rail transportation corridors, the Roanoke area is 15 miles from the DFW International Airport and only 5 miles from the Alliance Airport and the AllianceTexas development. The Roanoke 345/138 kV Switch and surrounding transmission facilities serve the electric demand for this region. The AllianceTexas development is a 27,000-acre master-planned, mixed-use development (nearly double the size of Manhattan) that spans two counties (Tarrant and Denton), seven municipalities (Fort Worth, Haslet, Roanoke, Westlake, Northlake, Denton, and Corral City) and five school districts. AllianceTexas includes 53 million square feet of commercial/industrial space that has been developed between 1990 and 2020, with more than 530 companies located at Alliance. There have been nearly 12,600 homes built (1990-2020) in this development, and 2,100 multifamily units exist with 375 multifamily units under construction. In 2020, AllianceTexas surpassed \$2.8 billion in paid property taxes to thirteen taxing entities. The expectation is that growth in the area will continue with commercial/industrial development supporting strong job growth and construction of necessary housing within sustainable communities. AllianceTexas and local developers state that there are approximately 2.5 million square feet of available office and mixed use space for future development, and multiple vacant sites in various configurations with total acreage of approximately 600 acres in the AllianceTexas development.⁴ The proposed upgrades provide necessary infrastructure to support the AllianceTexas region of north Fort Worth and Roanoke.

Limitations on local electric load service exist today. As available commercial/industrial locations become occupied, it will exacerbate the need for the proposed projects. In fact, this impact is already being felt: As more fully described below, there have been recent examples of Oncor's inability to meet the capacity needs of several prospective loads seeking interconnection due to certain facilities identified in this submittal reaching load-serving limits.

Electric service limitations are restricting the further development of large point loads, such as data centers, in the Roanoke - Alliance area. Today's limitation on available capacity create mandatory requirements for large load customers to either modify their load ramps to observe load limits on area facilities, adjust business plans for lack of adequate electric service capability, or choose to locate elsewhere. Oncor is in the challenging position of balancing available capacity among multiple competing requests and basing capacity allocation on the assurances, as well as timing, for a project to come to realization. Just over the past six months Oncor has received several requests for interconnection at both the distribution and transmission levels where Oncor has been limited in fulfilling or unable to fulfill a request for service due to autotransformer and line overloads that result in customer commercial adjustments or project cancellation. Three specific examples are described below:

9

⁴ "ALLIANCETEXAS: FACT SHEET", accessed January 03, 2022,

https://www.alliancetexas.com/Portals/0/Images/AllianceTexas/resources/facts/ATX%20Fact%20Sheet%202021.pdf?ver=I kykuMSpxF53z8s3VHQIZg%3d%3d

Customer **A**: a large data center requested interconnection(s) at the distribution level (~50MW) and the transmission level (~50-55MW, growing to ~220MW by 2025) to be directly interconnected on the Park Vista – Keller Tap 138 kV double-circuit line section. The data center was to be located at two different physical locations but the two facilities were dependent upon each other. Due to the capacity limitations on area facilities, Oncor was limited to providing 100 MW of total capacity to serve the requests. The customer was thereby compelled to decide how to adjust business plans to accept the balance of limited capacity between locations. The customer has elected to cancel the distribution request, move forward with the transmission interconnection, and will be business-constrained on the transmission point-of-interconnection until area line upgrades are completed and the full load ramp may be served. It is not known whether the distribution request will return when capacity may become available. It should be noted that had the customer moved forward with both requests, available area capacity would have been depleted and Oncor would have been positioned to deny the interconnection of additional customer requests for service in this area. Further, it was indeterminate for a period of time whether any or all capacity under study for service to fulfill this request would be available to serve other loads.

Customer B: a data center request for interconnection at the distribution level in 3 stages (Stage1: ~40MW; Stage2: ~40MW; Stage3: ~20MW) for a total 100MW by 2025. The project is underway in Stage1, and in triggering activities to move forward with Stage2. Current capacity limitations may prevent this customer from advancing to Stage3 and supplying full load under the request. Due to the continually-changing conditions, additional system evaluation will indicate what additional capacity, if any, may be available for providing service to this customer, or other load requests in advance of this customer moving into its next stage.

Customer C: a data center request for interconnection at the distribution level with an indicated 3 stage load ramp (Stage1: ~12MW, by June, 2022; Stage2: ~25MW, by 2027; Stage3: ~35MW, by 2032) for a total of ~72MW. The customer has indicated that they are ready for Oncor to proceed with development of a service plan. Oncor is currently working on this request. While the customer has provided a long term ramp in 5 year increments to achieve the maximum projected load of 72MW, it is likely that the growth will occur in a more uniform progression with load recurrently added over time. It presently appears there will be insufficient capacity available to serve any part of this customer request, based on the decisions of other requests currently in the queue. Oncor's ability to proceed is dependent on the addition of transmission infrastructure to support the requested load. A continuous load ramp over time requires the availability of forward-looking capacity. The lack of available capacity in this area will directly impact customer business plans, as discussed previously.

These requests demonstrate the regular activities occurring in the Roanoke – Alliance interconnection request queue. A review of the load levels in these requests demonstrates the challenges in providing service due to the constrained elements in the transmission system and existing limited available capacity. In addition to the overloads on the Roanoke 345/138 kV autos, transmission line loading limitations and voltage exceedances due to the existing and forecasted load at existing substations are limiting Oncor's ability to connect these additional large retail loads. In other words, because of these limitations, Oncor is currently unable to serve new customers requesting interconnection in this area or must offer to do so with substantial limitations. Additionally, as the local

economy and the Roanoke area continue to grow and local developers continue to market available office space and property for development, there will be a point in the near future when all excess capacity is depleted and customer requests will be denied for system reliability until area upgrades are placed in service.

Both the 2021 ERCOT Regional Transmission Plan⁵ and the 2020 ERCOT Constraints and Needs report⁶ indicate the overloads in this area and the need for system improvements. The 2021 ERCOT RTP also identified reliability project 2021-NC8 to mitigate these overloads and system deficiencies in this area.

The area loads used in the current planning cases are based largely on historical growth trends and exclude potential specific customer requests for large incremental load additions such as data centers. However, SB 1281 (87R) passed this last regular session requires the Commission to consider additional load in the interconnection queue, not just existing and future load. Adding these new loads to the overall evaluation will only heighten the need for this project. As described in the examples above of customer requests in the interconnection queue, large data centers are becoming increasingly prevalent in and around the Roanoke/Alliance area and must be considered by statute given their status in the interconnection queue.

Existing Transmission Capacity Utilization

The Roanoke area 345 kV transmission system is within a high power transfer corridor extending from the Panhandle area solar and wind farms to the DFW area load center, particularly the loads north of Fort Worth and north of Dallas (also a high load-growth area). The power transfer through this area and the load serving capabilities are enabled by facilities developed as part of the Competitive Renewable Energy Zone project, including the 345 kV circuits from Willow Creek into the Hicks substation and several circuits connecting into the Krum West substation. Many of these facilities are at or reaching their design limits. While the Roanoke Area Upgrades project is justified based on NERC and ERCOT's reliability criteria, it is also notable that during highwind / high-load periods the north Fort Worth area including Hicks and Roanoke/Alliance 345 kV and adjacent 138 kV transmission facilities regularly experience significant congestion, indicating full economic utilization. Additionally, the studies described in this report only include future planned generation projects that have met Planning Guide 6.9 criteria. There are additional, non-modeled solar and wind farms within the development process that have not yet met the criteria necessary to be modeled in this study. In fact, the Panhandle has seen a steady stream of new solar and wind farms being introduced into the generator interconnection process. Completion of generation projects in the Panhandle and High Plains regions of northwest Texas beyond those currently meeting Planning Guide Section 6.9 criteria will further exacerbate congestion in the subject area.

⁵2021 Regional Transmission Plan, December 2021,

 $https://www.ercot.com/files/docs/2021/12/23/2021_Regional_Transmission_Plan_Report_Public.zip$

⁶Report on Existing and Potential Electric System Constraints and Needs, December 2020,

https://www.ercot.com/files/docs/2020/12/23/2020_Report_on_Existing_and_Potential_Electric_System_Constraints_and _Needs.pdf

Alliance 345 kV Substation

The Alliance substation is a 345 kV substation with two 345-25.9 kV transformers. This is an atypical and undesirable substation arrangement, because the primary windings of Oncor's typical load-serving transformers are rated at either 138 kV or 69 kV. Oncor limits the operational capacity of this 345 kV substation due to the unavailability of a mobile 345-25.9 kV transformer. In the event of the loss of one 345-25.9 kV transformer, it could take many weeks to get a replacement transformer energized at the substation.

In addition, tying a distribution feeder from a 345 kV substation to a distribution feeder from a 138 kV substation presents operational challenges. For example, any switching that is necessary between two such feeders requires an open transition, resulting in an outage for any affected customers that they would not normally see under closed transition. Establishing a 138 kV substation at the current Alliance location will eliminate this potential impact to customers.

Due to the steady growth in economic development activity in the Roanoke area, it will become increasingly difficult to acquire land and right of way for necessary new stations and transmission lines in the next five to ten years. In addition, taking the Hicks – Roanoke 345 kV double-circuit line clearance necessary for construction will be exceptionally difficult, and even more so as the load continues to grow in the Roanoke area and more renewable generation is added in the Panhandle and West Texas. This \$285.9 million project in Denton, Tarrant, and Wise counties is recommended for construction to meet a May 2025 in-service date. Until the project is put in-service, Oncor will work with ERCOT, as necessary, to develop and implement Constraint Management Plans based on operational conditions and, if needed, Oncor will utilize line-sectionalizing switches and/or load-shed schemes to mitigate line overloads under contingency conditions.

Area Land Rights Challenges and Opportunities

As stated above the north Fort Worth/Roanoke – Alliance area is an area of dynamic development and growth. While this growth provides the electrical justification for this project, it also creates very real impediments or risks to the project. As the dense industrial and residential development in this area continues, available property for transmission lines and, more importantly, station facilities is disappearing. For this reason, Oncor is already in the process of securing the necessary real estate rights for all endpoints for the described Roanoke Area Upgrades. These sites have been vetted from both a cost and constructability basis but most importantly are or soon will be acquired.⁷ This acquisition is necessary to ensure that sufficient acreage is available for construction of both the switching and load serving station facilities. Without the acquisition of endpoints, there would be no guarantee of available real-estate for acquisition in the future after an ERCOT review and or PUC CCN proceeding. Oncor is aware that ERCOT's electrical analysis may reveal other transmission-connection alternatives. However, Oncor respectfully requests that ERCOT strongly consider the certainty provided by acquired station property as opposed to the uncertainty of new sites and the impact this uncertainty could have on the feasibility or in-service

⁷ Oncor initiated condemnation proceedings on the one endpoint it has not acquired as of the date of this submittal.

date of the project; marginal system flow improvements are a poor tradeoff for delay risks in such a high-growth area.

Given the time constraints noted above, the confirmation of the need for these projects in both the 2020 Constraints and Needs report and the 2021 Regional Transmission Plan (RTP), and the inclusion of these projects as reliability project 2021 NC-8 in the 2021 RTP, pursuant to ERCOT Planning Guide Section 3.1.4.2(1), Oncor respectfully requests ERCOT to use the findings from the 2021 RTP to serve as the ERCOT Independent Review of the proposed project.

Purpose and Necessity

Oncor performed contingency analysis in accordance with NERC Reliability Standard TPL-001-4 and the ERCOT Planning Guides. The proposed project is identified to resolve post-contingency system performance deficiencies under various contingency events and address transmission line and autotransformer overloads.

Planning Analysis

Steady State Analysis

Steady-State Cases

The project need was identified using the 2021 RTP cases posted by ERCOT on May 28, 2021 and the 2021 SSWG cases posted by ERCOT on June 23, 2021. The cases were updated with relevant off-cycle IDVs and tuned prior to starting the study.

Thermal Overloads

Starting in 2023, the 345/138 kV autotransformers at Hicks and Roanoke, and the Roanoke – Hicks 345 kV line exceed their emergency rating under contingency conditions. Tables 1 and 2 below show details for current configuration and the resulting thermal overloads under various contingency events as defined in NERC TPL-001-4 Reliability Standard and the ERCOT Planning Guides.

		Worst Contingency Loading (% of Rate B)						
Monitored Element	Worst Contingency	2	2021 RTP (NNC Cases	5	2021 SSWG Cases		
		2023	2024	2026	2027	2024	2028	
Roanoke 345/138 kV	Roanoke 345/138 kV	0.1	04	06	06	101	110	
Autotransformer #1	Autotransformer #2 (P1.3)	92	94	90	90	101	110	
Roanoke 345/138 kV	Roanoke 345/138 kV	04	0E	00	00	101	110	
Autotransformer #2	Autotransformer #1 (P1.3)	94	90	70	90	101	110	
Roanoke – Hicks 345 kV	Loss of either Roanoke – Hicks	80	07	01	0.2	00	107	
double-circuit line	345 kV circuit (P1.2)	60	0/	91	32	99	107	

Table 1 – Pre-project post N-1 contingency loading

		Worst Contingency Loading (% of Rate B)							
Monitored Element	Worst Contingency	2021 RTP NNC Cases				2021 SSWG Cases			
		2023	2024	2026	2027	2024	2028		
Roanoke 345/138 kV Autotransformer #1	Roanoke 345/138 kV Autotransformer + Roanoke – West Denton/Lewisville 345 kV	111	110	114	114	124	135		
Roanoke 345/138 kV Autotransformer #2	double-circuit line (ERCOT Requirement)	111	110	114	114	124	135		
Hicks 345/138 kV Autotransformer #1	Hicks 345/138 kV Autotransformer + Hicks – Alliance/Roanoke 345 kV	99	98	101	102	113	123		
Hicks 345/138 kV Autotransformer #2	double-circuit line (ERCOT Requirement)	100	99	102	104	113	123		
Hicks – Roanoke 345 kV line	Panda Sherman Train and either Hicks – Roanoke 345 kV circuit (P3.2)	95	93	97	99	104	113		

Table 2 – Pre-project post N-1-1 contingency loading

There are several other contingencies that result in similar thermal overloads of the above elements.

The proposed project includes a new 345 kV line between Ramhorn Hill and Dunham stations to mitigate the overloads on the Hicks 345/138 kV autotransformers and the Hicks – Roanoke 345 kV line. Even though the Hicks – Roanoke 345 kV line does not overload in the RTP cases initially, the line overload appears when implementing the portion of the recommended project designed to address the overloads on the Roanoke 345/138 kV autotransformers.

The following components comprise the portion of the recommended project that is needed to mitigate the overloads on the 345/138 kV Autotransformers at Roanoke Switch:

- Establish the Exchange 345/138 kV switching station, adjacent to Alliance 345 kV substation, with two 600 MVA Autotransformers in an 8-breaker 345 kV breaker-and-a-half bus arrangement and a 9-breaker 138 kV breaker-and-a-half arrangement
- Convert the existing Alliance 345 kV load serving substation to 138 kV operation
- Establish the Exchange Keller Wall Price 138 kV double-circuit line using a conductor rated at least 3121 A or greater with the following upgrades:
 - a. Construct the Exchange Keller Magnolia 138 kV double-circuit line
 - b. Upgrade the Keller Magnolia Keller Wall Price Switch 138 kV line using double-circuit capable structures
 - c. Establish a new 138 kV switching station at Keller Wall Price in a 6-breaker ring bus arrangement

- Disconnect the Keller Magnolia Tap Heritage/Keller Magnolia line at Keller Magnolia Tap and terminate at Keller Wall Price by constructing a new 0.3-mile double-circuit 138 kV transmission line
- Rebuild Exchange Roanoke 345 kV double-circuit line using separate double-circuit capable structures for each line with conductor rated at least 5000 A and establish the Exchange – Roanoke 138 kV circuit using one of the Exchange – Roanoke 345 kV line double-circuit capable structures rated at least 3200 A

Line Loading Limitations and Voltage Exceedances

Line Loading Limitations

Under peak load conditions, the Roanoke – Deen/Euless 138 kV double-circuit line serves approximately 1,000 MW of load as shown in Table 3. The first section of this line, Roanoke – Keller Magnolia Tap 138 kV doublecircuit line section is rated at 502 MVA and the remaining double-circuit line section is rated at 614 MVA. As referenced earlier, the Roanoke/Alliance area is a highly active area for growth and development in the DFW Metroplex region and forecasted load on the Roanoke – Deen/Euless line, which serves the immediate Roanoke/Alliance area, in the SSWG cases is exceeding the thermal limits. Planning criteria violations were observed following a NERC P2.1 contingency where the loss of the Euless Switch – Bedford Woodson Tap 138 kV line section results in Roanoke – Park Vista line section (east circuit) to load to 102% in the 2021SSWG 2024 summer peak case and the loss of the Deen Switch – Watauga 138 kV line section results in Roanoke – Park Vista line 102% in the 2021SSWG 2027 summer peak case. This double circuit line is approaching its loadability limit which will limit Oncor's ability to serve projected load growth in the coming years. Table 3 lists forecasted load being served by the Roanoke – Deen/Euless double-circuit line through 2028.

Line	2022	2023	2024	2025	2026	2027	2028
Roanoke – Deen	471	478	494	500	504	517	527
Roanoke – Euless	474	481	509	516	523	536	546
Total	945	959	1003	1016	1027	1053	1073

Table 3 - Forecasted load on Roanoke - Deen/Euless double-circuit line (in MW)

Voltage Criteria Exceedances

Starting in 2028, with the loss of Handley Unit #5 followed by the Roanoke – Park Vista 138 kV line section, several buses on the Roanoke – Deen 138 kV line experience voltages outside their emergency limits as shown in Table 4. Oncor's proposed solution mitigates the need for any additional var compensation devices.

Bus Number	Bus Name	Post Contingency Voltage (in p.u.)
15100	PARKVISTA1_8	0.890
2058	CIRCLET_P8	0.892
559	HERITAGE	0.893
12033	HRTAG1_T8	0.893
2036	KELLER2_T8	0.894
33565	KELLER2	0.894
2033	KLR_MAG1_T8	0.895
2037	WPKELLR1_8	0.899
566	CHERRYGROV	0.900
2035	BEARCK3_8	0.902
12028	CLYVIL2_8	0.905
2028	CLYVIL2_T8	0.906

Table 4 - Post Contingency Voltage Exceedances

Dynamic Analysis

Dynamic Cases and Changes

The case used for dynamic analysis was the DWG 2023 Summer Peak Case published on 2/11/2021. Changes were made to the base cases to account for the topology changes necessary to implement the submitted rebuild project.

Stability Criteria Exceedances

Oncor performed a dynamic analysis to evaluate the impact of this project on the transmission system in this area. Select contingencies in the project area were studied before and after the implementation of the project.

The study showed that no adverse dynamic stability impact was observed with implementation of the project.

Short-Circuit Study

Oncor evaluated the short-circuit impacts of the proposed project using the System Protection Working Group (SPWG) case "21_SPWG_2023_FY_06302021_FINAL". The SPWG case was modified to include changes associated with the proposed project, as well as other Oncor system changes that occurred since the development of the SPWG case. Oncor did not identify any overdutied breakers resulting from the proposed project.

Subsynchronous Resonance (SSR) Screening

Oncor performed an SSR screening assessment with all series capacitors and generator units in service, to identify new potential SSR vulnerabilities within the ERCOT system as a result of the proposed project. The study was performed with and without the proposed project and confirmed the proposed project did not create any new or shorter paths leading to generation sources becoming radial to series capacitors in the event of fewer than 14 concurrent transmission outages. No further SSR analysis is required for this proposed project.

Project Description

To meet reliability objectives, relieve overloading, and provide adequate transmission capacity for contingency conditions, Oncor proposes the following:

- Establish the Exchange 345/138 kV Switching Station, adjacent to Alliance 345 kV Substation, with two 600 MVA Autotransformers in a 8-breaker 345 kV breaker-and-a-half bus arrangement and a 9-breaker 138 kV breaker-and-a-half arrangement
- Convert the existing Alliance 345 kV load serving substation to 138 kV operation
- Establish the Exchange Keller Wall Price 138 kV double-circuit line using a conductor rated at least 3121 A or greater with the following upgrades:
 - a. Construct the Exchange Keller Magnolia 138 kV double-circuit line
 - b. Upgrade the Keller Magnolia Keller Wall Price Switch 138 kV line using double-circuit capable structures
 - c. Establish a new 138 kV switching station at Keller Wall Price in a 6-breaker ring bus arrangement
 - d. Disconnect the Keller Magnolia Tap Heritage/Keller Magnolia line at Keller Magnolia Tap and terminate at Keller Wall Price by constructing a new 0.3-mile double-circuit 138 kV transmission line
- Establish the Ramhorn Hill 345 kV switching station in a 10-breaker breaker-and-a-half arrangement
- Establish Dunham 345 kV switching station with in a 10-breaker breaker-and-a-half arrangement
- Construct an estimated 18.4-mile triple-circuit line between Ramhorn Hill and Dunham with:
 - a. Two 345 kV circuits using conductor rated at least 5000 A
 - b. A vacant position for a future 138 kV circuit to support future load serving substations in growth areas
- Rebuild Exchange Roanoke 345 kV double-circuit line using separate double-circuit capable structures for each line with conductor rated at least 5000 A and establish the Exchange – Roanoke 138 kV circuit using one of the Exchange – Roanoke 345 kV line double-circuit capable structures rated at least 3200 A
- Ensure all new 345 kV terminals at Exchange, Ramhorn Hill, and Dunham are rated 5000 A and 138 kV terminals at Exchange, Keller Wall Price, and Roanoke are rated 3200 A
- The proposed project will require applications for Certificate of Convenience and Necessity (CCN) for the Exchange – Keller Wall Price 138 kV double-circuit line, the Ramhorn Hill – Dunham 345 kV doublecircuit line, and the Exchange – Roanoke 138 kV line.

The estimated cost for this project is \$285.9 million.

One-Line Diagram



Figure 5 - Proposed Upgrades (Option #1) One-Line

Alternative Solutions Tested

To meet reliability objectives, relieve overloading, and provide adequate transmission capacity for contingency conditions, Oncor also studied the following alternative solutions:

Option #2 (O2):

- Establish Dunham 345 kV switching station with 8-breaker in a breaker-and-a-half arrangement
- Establish Dunham 138 kV switching station with in a 5-breaker breaker-and-a-half arrangement
- Establish two new 345/138 kV autotransformers at the proposed Dunham 345 kV switching station
- Construct an estimated 1-mile 138 kV double-circuit line from Dunham to Cross Timbers with conductor rated 3200 A or greater

Tables 5, 6, and 7 below show that Option #2 reduces the thermal overloads during post-contingency conditions as compared to the existing configuration. However, it does not entirely relieve the thermal overloads across all monitored elements. Specifically, the worst contingency loading on both 345/138 kV autotransformers at Roanoke and Hicks 345/138 kV Autotransformer #2 remain above their emergency rating in the RTP cases and none of the identified deficiencies are mitigated in the SSWG cases. In addition, Option #2 does not resolve voltage exceedances or improve load serving capability on the Roanoke – Deen/Euless 138 kV double-circuit line. Option #2 therefore is not a feasible solution.



Figure 6 - Option #2 One-Line

Option #3 (O3):

- Establish the Ramhorn Hill 345 kV switching station in a 10-breaker breaker-and-a-half arrangement
- Establish Dunham 345 kV switching station with in a 11-breaker breaker-and-a-half arrangement
- Construct an estimated 18.4-mile 345 kV double-circuit line from Ramhorn Hill to Dunham with conductor rated 5000 A or greater
- Establish Dunham 138 kV switching station with in a 5-breaker breaker-and-a-half arrangement
- Establish two new 345/138 kV autotransformers at the proposed Dunham 345 kV switching station
- Construct an estimated 1-mile 138 kV double-circuit line from Dunham to Cross Timbers with conductor rated 3200 A or greater

This alternative would enable an alternative pathway of flow from Roanoke Switching Station to a new 345 kV switch.

Tables 5, 6, and 7 below show that Option #3 eliminates post-contingency overloads for all of the elements of concern in the RTP cases. While Option #3 reduces the post-contingency loading on some elements, it fails to mitigate all thermal overloads such as the Roanoke 345/138 kV Autotransformer #1 and #2 which will continue to overload in the SSWG cases. In addition, Option #3 does not resolve voltage exceedances or improve load serving capability on the Roanoke – Deen/Euless 138 kV double-circuit line. Option #3 is therefore not a feasible solution.





Option #1 (O1) in Table 5, 6, and 7 below is the recommended solution. While both Option #2 and Option #3 reduce post-contingency thermal overloads, it is clear from the steady-state analysis that the proposed project,

Option #1, most effectively resolves all thermal overloads across all case years as well as load-serving limitations and voltage exceedances on the Roanoke – Euless/Deen double-circuit line and is therefore the optimal solution. Option #1 also resolves the concerns discussed above with the Alliance 345 kV substation.

	Worst Contingency Loading (% of Rate B)															
Element	2021 RTP NNC Cases															
	2023 Sum			2024 Sum			2026 Sum			2027 Sum						
	Base	01	02	03	Base	01	02	03	Base	01	02	03	Base	01	02	03
Roanoke 345/138 kV Autotransformer #1	111	74	107	84	110	73	106	88	114	75	109	91	114	75	109	91
Roanoke 345/138 kV Autotransformer #2	111	74	108	84	110	73	106	88	114	75	109	91	114	75	109	91
Hicks 345/138 kV Autotransformer #1	99	66	96	72	98	65	95	71	101	66	98	72	102	66	99	72
Hicks 345/138 kV Autotransformer #2	100	66	98	72	99	66	96	72	102	67	99	73	104	67	101	73
Roanoke – Hicks 345 kV line	95	71	97	57	93	71	95	56	97	73	98	58	99	75	100	59
Performance Requirements Met		Yes	No	Yes		Yes	No	Yes		Yes	No	Yes		Yes	No	Yes

Table 5 – Post Contingency Loading Comparison using RTP NNC Cases

Element	Worst Contingency Loading (% of Rate B) in 2021 SSWG Cases									
Element		2024	Sum		2028 Sum					
	Base	01	02	03	Base	01	02	03		
Roanoke 345/138 kV Autotransformer #1	124	82	121	95	135	89	131	103		
Roanoke 345/138 kV Autotransformer #2	124	82	121	95	135	89	131	103		
Hicks 345/138 kV Autotransformer #1	113	74	110	80	123	79	120	85		
Hicks 345/138 kV Autotransformer #2	113	74	110	80	123	79	120	85		
Roanoke – Hicks 345 kV line	104	79	105	62	113	86	114	67		
Performance Requirements Met		Yes	No	Yes		Yes	No	No		

Table 6 - Post Contingency Loading Comparison using 2021 SSWG Cases

Bus Number	Bus Name	Worst Contingency Voltage Results (in p.u.) 2028 Sum (2021 SSWG Case)						
		Base	01	O2	O3			
15100	PARKVISTA1_8	0.890	>0.95	0.893	0.897			
2058	CIRCLET_P8	0.892	>0.95	0.895	0.898			
559	HERITAGE	0.893	>0.95	0.896	0.900			
12033	HRTAG1_T8	0.893	>0.95	0.896	0.900			
2036	KELLER2_T8	0.894	>0.95	0.897	0.901			
33565	KELLER2	0.894	>0.95	0.897	0.901			
2033	KLR_MAG1_T8	0.895	>0.95	0.899	0.902			
2037	WPKELLR1_8	0.899	>0.95	0.903	0.906			
566	CHERRYGROV	0.900	>0.95	0.903	0.906			
2035	BEARCK3_8	0.902	>0.95	0.905	0.909			
12028	CLYVIL2_8	0.905	>0.95	0.908	0.911			
2028	CLYVIL2_T8	0.906	>0.95	0.909	0.912			
Performance Requirements Met			Yesi	No	No			

Table 7 – Post Contingency Voltage Comparison using 2021 SSWG Case

Recommendation

In order to address these reliability concerns, Oncor recommends Option #1, which consists of the following:

- Establish the Exchange 345/138 kV Switching Station, adjacent to Alliance 345 kV Substation, with two 600 MVA Autotransformers in a 8-breaker 345 kV breaker-and-a-half bus arrangement and a 9-breaker 138 kV breaker-and-a-half arrangement
- Convert the existing Alliance 345 kV load serving substation to 138 kV operation
- Establish the Exchange Keller Wall Price 138 kV double-circuit line using a conductor rated at least 3121 A or greater with the following upgrades:
 - a. Construct the Exchange Keller Magnolia 138 kV double-circuit line
 - b. Upgrade the Keller Magnolia Keller Wall Price Switch 138 kV line using double-circuit capable structures
 - c. Establish a new 138 kV switching station at Keller Wall Price in a 6-breaker ring bus arrangement
 - Disconnect the Keller Magnolia Tap Heritage/Keller Magnolia line at Keller Magnolia Tap and terminate at Keller Wall Price by constructing a new 0.3-mile double-circuit 138 kV transmission line
- Establish the Ramhorn Hill 345 kV switching station in a 10-breaker breaker-and-a-half arrangement
- Establish Dunham 345 kV switching station with in a 10-breaker breaker-and-a-half arrangement
- Construct an estimated 18.4-mile triple-circuit line between Ramhorn Hill and Dunham with:
 - a. Two 345 kV circuits using conductor rated at least 5000 A
 - A vacant position for a future 138 kV circuit to support future load serving substations in growth areas
- Rebuild Exchange Roanoke 345 kV double-circuit line using separate double-circuit capable structures for each line with conductor rated at least 5000 A and establish the Exchange – Roanoke 138 kV circuit using one of the Exchange – Roanoke 345 kV line double-circuit capable structures rated at least 3200 A
- Ensure all new 345 kV terminals at Exchange, Ramhorn Hill, and Dunham are rated 5000 A and 138 kV terminals at Exchange, Keller Wall Price, and Roanoke are rated 3200 A
- The proposed project will require applications for Certificate of Convenience and Necessity (CCN) for the Exchange – Keller Wall Price 138 kV double-circuit line, the Ramhorn Hill – Dunham 345 kV doublecircuit line, and the Exchange – Roanoke 138 kV line.

This project will eliminate all thermal and voltage deficiencies described in this report under all studied conditions and will provide the required transmission infrastructure for the future load growth in the region.



GENERAL SESSION MINUTES OF THE BOARD OF DIRECTORS MEETING OF ELECTRIC RELIABILITY COUNCIL OF TEXAS, INC.

8000 Metropolis Drive (Building E), Suite 100, Boardroom B Austin, Texas 78644 August 16, 2022

Pursuant to notice duly given, the meeting of the Board of Directors (Board) of Electric Reliability Council of Texas, Inc. (ERCOT), convened on the above-referenced date.

Meeting Attendance:

Board Members:		
Director	Affiliation/Role (if any)	Voting Category
Aguilar, Carlos	N/A	Voting
Ekoh, Chris	Office of Public Utility Counsel, Interim Public Counsel	Voting
England, Julie	N/A	Voting
Flexon, Bob	N/A	Voting
Flores, Bill (Vice Chair)	N/A	Voting
Foster, Paul (Chair)	N/A	Voting
Heeg, Peggy	N/A	Voting
Jones, Brad	ERCOT President and Chief Executive Officer (CEO)	Non-Voting
Lake, Peter	Public Utility Commission of Texas (PUCT, Commission), Chairman	Non-Voting
Smati, Zin	N/A	Voting
Swainson, John (Via Teleconference)	N/A	Voting

Officers and Guests:

Officer/Guest	Role
Bigbee, Nathan	ERCOT Deputy General Counsel
Billo, Jeff	ERCOT Director of Operations Planning
Bivens, Carrie	Potomac Economics, ERCOT Independent Market Monitor (IMM),
	Director
Cline, Darrell	City of Garland
Cobos, Lori	PUCT Commissioner

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Day, Betty	ERCOT Vice President of Security and Compliance and Chief
	Compliance Officer
Gleason, Brandon	ERCOT Deputy General Counsel
Glotfelty, Jimmy (Via	PUCT Commissioner
Teleconference)	
Helton, Bob	Engie North America Inc., Technical Advisory Committee (TAC)
	Vice Chair
Hobbs, Kristi	ERCOT Vice President of Corporate Strategy and PUC Relations
Jackson, Kathleen	PUCT Commissioner
Lange, Clif	South Texas Electric Cooperative, Inc., TAC Chair
Levine, Jonathan	ERCOT Assistant General Counsel and Assistant Corporate
	Secretary
McAdams, Will	PUCT Commissioner
Ögelman, Kenan	ERCOT Vice President of Commercial Operations
Parakkuth, Jayapal	ERCOT Vice President and Chief Information Officer
Rainwater, Kim	ERCOT Corporate Counsel
Rickerson, Woody	ERCOT Vice President of System Planning and Weatherization
Rychetsky, Penny	ERCOT Director of Internal Audit
San Miguel, Senaida	Texas Sunset Advisory Commission, Policy Analyst
Schein, Chris	ERCOT Interim Head of Communications
Seely, Chad V.	ERCOT Vice President, General Counsel and Corporate Secretary
Spak, Mara	ERCOT Vice President of Human Resources
Tamby, Jeyant	ERCOT Senior Vice President, Chief Administrative Officer and
	Chief of Staff
Taylor, Sean	ERCOT Vice President and Chief Financial Officer
Woodfin, Dan	ERCOT Vice President of System Operations

Call General Session to Order and Announce Proxies (Agenda Item 1)

Paul Foster, Board Chair, determined that a quorum was present and called the Board meeting to order at approximately 9:08 a.m.

Chair Foster welcomed new PUCT Commissioner Kathleen Jackson to her first Board meeting after being sworn in last week. Chair Foster recognized Peter Lake, Chairman of the PUCT. Chairman Lake called an Open Meeting of the Commission to order to consider matters that had been duly posted with the Texas Secretary of State for August 16, 2022. Chairman Lake also welcomed Commissioner Jackson to the meeting.

Chair Foster reported there were no proxies for the meeting and that Board member John Swainson had joined the meeting via teleconference for non-voting participation only. Chair Foster highlighted the Antitrust Admonition.

Board Ratification and PUC Action on CEO Matters

Chair Foster reported that yesterday (August 15, 2022), the Board held an urgent meeting to address urgent, time-sensitive personnel matters and discussed the reason for holding the urgent meeting. He reported that at the end of the meeting, the Board voted to approve two personnel matters discussed in Executive Session involving the selection of Pablo Vegas as

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ERCOT's President and CEO to begin on October 1, 2022 and the execution of an employment agreement with Mr. Vegas. Chair Foster and Board Vice Chair Bill Flores commented on Mr. Vegas' selection. Chair Foster indicated that, consistent with the Public Utility Regulatory Act, ERCOT's Bylaws require that actions taken by the Board on notice of less than seven days be ratified at the Board's next regular meeting. Chair Foster entertained a motion to ratify the action taken at the August 15, 2022 urgent Board meeting to approve the two personnel matters discussed in Executive Session.

Vice Chair Flores moved to ratify the action taken at the August 15, 2022 urgent Board meeting. Julie England seconded the motion. The motion passed by unanimous voice vote with no abstentions.

Chair Foster recognized Chairman Lake. At Chairman Lake's invitation, the other PUCT Commissioners also commented on Mr. Vegas and thanked Mr. Jones for his service. Following discussion, Chairman Lake entertained a motion. Commissioner Will McAdams moved that the Commission approve Pablo Vegas as CEO of ERCOT and approve his compensation as described in the term sheet delivered to the Commissioners by ERCOT. Commissioner Lori Cobos seconded the motion. The motion for Commission approval passed by unanimous voice vote with no abstentions.

Board members discussed the selection process and Mr. Vegas's background and experience. They also thanked Interim President and CEO Brad Jones for his service.

Chair Foster addressed the following Agenda Items in the order below.

Notice of Public Comment, if Any (Agenda Item 2)

Chair Foster announced that on the agenda for the meeting, which was posted publicly on August 9, 2022, ERCOT had provided instructions for members of the public who were interested in commenting in person and that to date no individuals had expressed interest in commenting, which Chad Seely confirmed.

Consent Agenda; Unopposed Revision Requests Recommended by TAC for Approval (Agenda Items 3, 3.1, 3.1.1 – 3.1.7, and 3.2)

Chair Foster presented the Consent Agenda. Mr. Seely reviewed the cost impacts of the Revision Requests on the Consent Agenda. Chair Foster entertained a motion to approve the Consent Agenda as follows:

- NPRR1085, Ensuring Continuous Validity of Physical Responsive Capability (PRC) and Dispatch through Timely Changes to Resource Telemetry and Current Operating Plans (COPs);
- NPRR1131, Controllable Load Resource Participation in Non-Spin;
- NPRR1133, Clarify Responsibilities for Submission of Planning Model Data for DC Ties;
- NPRR1134, Related to RMGRR168, Modify ERCOT's Mass Transition Responsibilities;
- NPRR1135, Add On-Line Status Check for Resources Telemetering OFFNS for Ancillary Service Imbalance Settlements;



- NPRR1136, Updates to Language Regarding a QSE Moving Ancillary Service Responsibility Between Resources;
- NPRR1137, Updates to Section 1.1 to Modify the OBD List Review Timeline and Other Clarifications;
- OBDRR040, ORDC Changes Related to NPRR1131, Controllable Load Participation in Non-Spin;
- PGRR101, Related to NPRR1133, Clarify Responsibilities for Submission of Planning Model Data for DC Ties;
- RMGRR168, Modify ERCOT's Mass Transition Responsibilities;
- SCR822, Create Daily Energy Storage Integration Report and Dashboard; and
- Reliability Unit Commitment (RUC) Cost Scaling Parameter Change.

Ms. England moved to recommend approval of the Consent Agenda as presented. Bob Flexon seconded the motion. The motion passed by unanimous voice vote with no abstentions.

<u>General Session Meeting Minutes; June 21, 2022 Meeting; July 29, 2022 Urgent Meeting</u> (Agenda Items 4 and 4.1 – 4.2)

Chair Foster entertained a motion to approve the General Session Meeting Minutes (Minutes) from the June 21, 2022 Board meeting and the July 29, 2022 urgent Board meeting.

Zin Smati moved to approve the Minutes as presented. Peggy Heeg seconded the motion. The motion passed by unanimous voice vote with no abstentions.

CEO Update (Agenda Item 5)

Brad Jones presented the CEO Update. He recognized ERCOT Operators for their effective work during July's hot weather event. Mr. Jones stated that it was his last Board meeting as Interim President and CEO, though he will assist Mr. Vegas during the transition, and thanked Market Participants, the Board, ERCOT staff, and Texas consumers.

Load Forecasting Overview (Agenda Item 6)

Jeff Billo presented the Load Forecasting Overview, including the various load forecasts that ERCOT uses for operations, transmission planning and financial budget planning. Board members and Mr. Billo discussed the number of models ERCOT staff uses to forecast Load, back-cast analyses, ways to improve forecasting, and forecasting of crypto loads.

Independent Market Monitor (IMM) Report (Agenda Item 7)

Carrie Bivens presented the IMM Report.

TAC Report; Non-Unanimous Revision Requests Recommended by TAC for Approval; NPRR1142, ERS Changes to Reflect Updated PUCT Rule Changes re SUBST. R. 25.507 – URGENT; OBDRR042, Related to NPRR1142, ERS Changes to Reflect Updated PUCT Rule Changes re SUBST. R. 25.507 – URGENT (Agenda Items 8, 8.1 and 8.1.1 – 8.1.2) Clif Lange, TAC Chair, presented the TAC Report.

August 16, 2022 Board General Session Meeting Minutes ERCOT Public



Chair Foster entertained a motion to approve the following Non-Unanimous Revision Requests recommended by TAC for approval:

- NPRR1142, ERS Changes to Reflect Updated PUCT Rule Changes re SUBST. R. 25.507 URGENT; and
- OBDRR042, Related to NPRR1142, ERS Changes to Reflect Updated PUCT Rule Changes re SUBST. R. 25.507 URGENT.

Carlos Aguilar moved to approve NPRR1142 and OBDRR042, each as presented. Mr. Flexon seconded the motion. The motion passed by unanimous voice vote with no abstentions.

Executive Session; Vote on Matters from Executive Session (Agenda Item 17)

Chair Foster recessed General Session at approximately 10:23 a.m. and convened Executive Session at approximately 10:53 a.m. Chair Foster reconvened General Session at approximately 2:59 p.m.

Chair Foster entertained motions for two matters discussed during Executive Session.

Vice Chair Flores moved to select ERCOT's 401(k) Savings Plan Auditor as recommended by the F&A Committee and as discussed during Executive Session. Mr. Flexon seconded the motion. The motion passed by unanimous voice vote with no abstentions.

Vice Chair Flores moved to approve the litigation matter discussed during Executive Session under Agenda Item ES 7.2. Mr. Aguilar seconded the motion. The motion passed by unanimous voice vote with no abstentions.

Board-Tabled Revision Requests; NPRR1112, Reduction of Unsecured Credit Limits – URGENT; ERCOT Presentation on Information Requested by Board; ERCOT Statement; TAC Advocate Statement; Background Information (Agenda Items 9, 9.1, and 9.1.1 – 9.1.4) At Chair Foster's request, Mr. Seely introduced NPRR1112, which the Board tabled at its April 28, 2022 and June 21, 2022 meetings. Chair Foster invited ERCOT staff to present additional information requested by the Board and ERCOT's position on NPRR1112, and Darrell Cline of City of Garland to present TAC's position. Kenan Ögelman presented the ERCOT Presentation on Information Requested by Board and ERCOT Statement. Mr. Cline presented the TAC Advocate Statement. Following Board discussion, Chair Foster entertained a motion regarding NPRR1112.

Mr. Flexon moved to reject the TAC Recommendation on NPRR1112; and to recommend approval of NPRR1112 as recommended by TAC in the April 13, 2022 TAC Report as amended by the March 18, 2022 ERCOT comments, and the December 22, 2021 Impact Analysis, with a priority of 2022 and rank of 3630 and a proposed effective date of upon system implementation and October 1, 2023. Mr. Aguilar seconded the motion. The motion passed by unanimous voice vote with no abstentions.

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ERCOT Recommendations to PUC Project No. 46304, Oversight Proceeding Regarding ERCOT Matters Arising Out of PUC Docket No. 45624 Relating to DC Tie Project Proposed by Southern Cross Transmission, LLC; Directive 1, Registration and Market Segment; Directive 11, Cost Allocation; Directive 12, QSE Costs (Agenda Items 10 and 10.1 – 10.3) Nathan Bigbee presented ERCOT staff's determinations regarding Directives 1, 11, and 12 in regard to PUC Project No. 46304, Oversight Proceeding Regarding ERCOT Matters Arising Out of PUC Docket No. 45624 Relating to DC Tie Project Proposed by Southern Cross Transmission, LLC.

Vice Chair Flores moved to accept ERCOT staff's determinations on Commission Directives 1, 11, and 12, each as presented. Mr. Aguilar seconded the motion. The motion passed by unanimous voice vote with no abstentions.

<u>Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition RPG Project</u> (Agenda Item 11)

Woody Rickerson presented the Bearkat – North McCamey – Sand Lake 345-kV Transmission Line Addition Regional Planning Group (RPG) Project (Stage 2), which ERCOT staff independently reviewed and which TAC and the Reliability and Markets (R&M) Committee each voted unanimously to endorse, based on North American Electric Reliability Corporation (NERC) and ERCOT reliability planning criteria, including ERCOT staff's recommendation that the project be designated as critical to the reliability of the ERCOT System pursuant to PUCT Substantive Rule 25.101(b)(3)(D). Chair Foster entertained a motion.

Mr. Flexon moved to endorse the need for the Bearkat – North McCamey – Sand Lake 345kV Addition RPG Project, which ERCOT staff independently reviewed and which TAC and the R&M Committee each voted unanimously to endorse, based on NERC and ERCOT reliability planning criteria, and to designate the project as critical to the reliability of the ERCOT System pursuant to PUCT Substantive Rule 25.101(b)(3)(D). Mr. Aguilar seconded the motion. The motion passed by unanimous voice vote with no abstentions.

Roanoke Area Upgrades RPG Project (Agenda Item 12)

Mr. Rickerson presented the Roanoke Area Upgrades RPG Project, which ERCOT staff independently reviewed and recommended improvements known as Option 2, and which TAC and the R&M Committee each voted unanimously to endorse, based on NERC and ERCOT reliability planning criteria, including ERCOT staff's recommendation that the project be designated as critical to the reliability of the ERCOT System pursuant to PUCT Substantive Rule 25.101(b)(3)(D). Chair Foster entertained a motion.

Ms. England moved to endorse the need for the Roanoke Area Upgrades RPG Project, which ERCOT staff independently reviewed and which TAC and the R&M Committee each voted unanimously to endorse, based on NERC and ERCOT reliability planning criteria, and to designate the project as critical to the reliability of the ERCOT System pursuant to PUCT Substantive Rule 25.101(b)(3)(D). Ms. Heeg seconded the motion. The motion passed by unanimous voice vote with no abstentions.

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Finance and Audit (F&A) Committee Report; Acceptance of ERCOT's 401(k) Savings Plan Audit Report (Agenda Items 13 and 13.1)

Vice Chair Flores, Finance and Audit (F&A) Committee Chair, reported that the F&A Committee met the prior day and highlighted items discussed at the F&A Committee meeting. He presented the F&A Committee's recommendation regarding the acceptance of ERCOT's 401(k) Savings Plan Audit Report. Vice Chair Flores moved to accept the ERCOT 2021 401(k) Savings Plan Audit Report as recommended by the F&A Committee. Ms. Heeg seconded the motion. The motion passed by unanimous voice vote with no abstentions.

Human Resources and Governance (HR&G) Committee Report (Agenda Item 14)

Ms. Heeg, Human Resources and Governance (HR&G) Committee Chair, reported that the HR&G Committee met the prior day and highlighted items discussed at the HR&G Committee meeting, including discussion of amending the company's Bylaws to give Board ownership of the governance documents without approval by the Corporate Members. Chairman Lake commented on Texas Senate Bill 2, the Legislature's intent, and the TAC structural redesign. Chair Foster commented on Senate Bill 2, and Mr. Flexon, R&M Committee Chair, discussed the R&M Committee's work with TAC on structural changes and how the outcome of this work may impact the R&M Committee charter.

Reliability and Markets (R&M) Committee Report (Agenda Item 15)

Mr. Flexon reported that the R&M Committee met the prior day and highlighted items discussed at the R&M Committee meeting.

Other Business (Agenda Item 16)

No other business was discussed.

Adjournment (Agenda Item 18)

Chair Foster adjourned the meeting at approximately 3:52 p.m.

Board materials and presentations from the meeting are available on ERCOT's website at <u>https://www.ercot.com/committees/board</u>.

∕Jonathan M. Levine Assistant Corporate Secretary