

Curriculum Vitae -- Paul J. Alvarez MM, NPDP

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Profile

After 15 years in Fortune 500 product development and product management, including P&L responsibility, Mr. Alvarez entered the utility industry by way of demand-side management rate and program development, marketing, and impact measurement for Xcel Energy in 2001. He has since designed renewable portfolio standard compliance and distributed generation rates and incentive programs. These experiences led to unique projects involving the measurement of grid modernization costs and benefits (energy, capacity, operating savings, revenue capture, reliability, environmental, and customer experience), which revealed the limitations of current utility regulatory and governance models. Mr. Alvarez currently serves as the President of the Wired Group, a boutique consultancy serving consumer and environmental advocates, regulators, associations, and suppliers.

Appearances and Research Projects in Regulatory Proceedings

Critique of Investment in Traditional Meters (Equipped with AMR). Testimony before the New Hampshire Public Utilities Commission recommending rejection of cost recovery. DE 19-057. December 20, 2019.

Critique of Smart Meter Benefits Claimed by Puget Sound Energy. Testimony before the Washington Utility and Telecom Commission recommending rejection of cost recovery pending demonstration of benefits in excess of costs. UE-190529 and UG-190530. November 22, 2019.

Critique of Smart Meter Benefits Claimed by Rockland Electric Company. Testimony before the New Jersey Board of Public Utilities on behalf of the Division of Consumer Advocate recommending rejection of cost recovery pending demonstration of benefits in excess of costs. ER19050552. October 11, 2019.

Critique of Grid Improvement Plan Proposed by Indianapolis Power and Light. Testimony before the Indiana Utility Regulatory Commission recommending reductions in the size of the plan (\$1.2 billion) based on benefit-cost analyses of plan components. Cause 45264. October 7, 2019.

Investigation into Distribution Planning Processes. Comments to the Michigan Public Service Commission recommending a transparent, stakeholder-engaged distribution planning process. U-20147. September 11, 2019.

Investigation into Grid Modernization. Comments to the New Hampshire Public Utilities Commission recommending a transparent, stakeholder-engaged distribution planning process. IR 15-296. September 6, 2019.

Arguments to Reduce and Re-prioritize Grid Modernization Investments Proposed by Pacific Gas & Electric. Testimony before the California Public Utilities Commission. A.18-12-009. July 26, 2019.

Evaluation of Xcel Energy's Request for an Advance Determination of Prudence Regarding Natural Gas Generation Plant Purchase. Testimony before the North Dakota Public Service Commission. PU-18-403. May 28, 2019.

Critique of Smart Meter Replacement Program Implied by Proposed Duke Energy Ohio Global Settlement Agreement. Testimony before the Public Utilities Commission of Ohio on behalf of the Office of Consumer Counsel. Numerous cases including 17-0032-EL-AIR. June 25, 2018.

Support for Considering Duke Energy Grid Modernization Investments in a Distinct Proceeding. Testimony before the North Carolina Utilities Commission on behalf of the Environmental Defense Fund. E-2 Sub 1142, October 18, 2017 and E-7 Sub 1146, January 19, 2018.

Evaluation of Southern California Edison's Request to Invest \$2.3 Billion in its Grid to Accommodate Distributed Energy Resources. Testimony before the California Public Utilities Commission on behalf of The Utility Reform Network. A16-09-001. May 2, 2017.

Evaluation of Kentucky Utilities/Louisville Gas & Electric Smart Meter Deployment Plan. Testimony before the Kentucky Public Service Commission on behalf of the Kentucky Attorney General in 2016-00370/2016-00371. March 3, 2017. Also in 2018-00005 May 18, 2018

Evaluation of National Grid's Massachusetts Smart Meter Deployment Plan. Testimony before the Massachusetts Department of Public Utilities on behalf of the Massachusetts Attorney General in 15-120. March 10, 2017. Also Unifil in 15-121 and Eversource in 15-122/123, March 10, 2017

Evaluation of Pacific Gas & Electric's Request to Invest \$100 Million in Its Grid to Accommodate Distributed Energy Resources. Testimony before the California Public Utilities Commission on behalf of The Utility Reform Network, A15-09-001. April 29, 2016

Recommendations on Metropolitan Edison's Grid Modernization Plan. Testimony before the Pennsylvania Public Utilities Commission on behalf of the Environmental Defense Fund in R-2016-2547449. July 21, 2016.

Arguments to Consider Duke Energy's Smart Meter CPCN in the Context of a Rate Case. Testimony before the Kentucky Public Service Commission on behalf of the Attorney General in 2016-00152. July 18, 2016.

Evaluation of Westar Energy's Proposal To Mandate a Rate Specific to Distributed Generation-Ownning Customers. Testimony before the Kansas Corporation Commission on Behalf of the Environmental Defense Fund, case 15-WSEE-115-RTS. July 9, 2015.

Regulatory Reform Proposal to Base a Significant Portion of Utility Compensation on Performance in the Public Interest. Testimony before the Maryland PSC on behalf of the Coalition for Utility Reform, case 9361. December 8, 2014.

Duke Energy Ohio Smart Grid Audit and Assessment. Primary research and report prepared for the Public Utilities Commission of Ohio case 10-2326-GE. June 30, 2011.

SmartGridCity™ Demonstration Project Evaluation Summary. Primary research and report prepared for Xcel Energy. Colorado Public Utilities Commission case 11A-1001E. October 21, 2011.

Books

Smart Grid Hype & Reality: A Systems Approach to Maximizing Customer Return on Utility Investment. Second edition. ISBN 978-0-615-88795-1. Wired Group Publishing. 360 pages. 2018.

Noteworthy Publications

The Rush to Modernize: An Editorial on Distribution Planning and Performance Measurement. With Sean Ericson and Dennis Stephens. Public Utilities Fortnightly. July 8, 2019. Pages 116+

Modernizing the Grid in the Public Interest: Getting a Smarter Grid at the Least Cost for South Carolina Customers. Whitepaper co-authored with Dennis Stephens for GridLab. January 31, 2019

Modernizing the Grid in the Public Interest: A Guide for Virginia Stakeholders. Whitepaper co-authored with Dennis Stephens for GridLab. October 5, 2018.

Measuring Distribution Performance? Benchmarking Warrants Your Attention. With Sean Ericson. Electricity Journal. Volume 31 (April, 2018), pages 1-6.

Busting Myths: Investor-Owned Utility Performance Can be Credibly Benchmarked. With Joel Leonard. Electricity Journal. Volume 30 (October, 2017), pages 45-48.

Price Cap Electric Ratemaking: Does it Merit Consideration? With Bill Steele. Electricity Journal. Volume 30, (October, 2017), pages 1-7.

Integrated Distribution Planning: An Idea Whose Time has Come. Public Utilities Fortnightly. November, 2014; also International Confederation of Energy Regulators Chronicle, 3rd Ed, March, 2015

Smart Grid Economic and Environmental Benefits: A Review and Synthesis of Research on Smart Grid Benefits and Costs. Secondary research report prepared for the Smart Grid Consumer Collaborative. October 8, 2013. Companion piece: Smart Grid Technical and Economic Concepts for Consumers.

Is This the Future? Simple Methods for Smart Grid Regulation. Smart Grid News. October 2, 2014.

A Better Way to Recover Smart Grid Costs. Smart Grid News. September 3, 2014.

Why Should We Switch to Performance-based Compensation? Smart Grid News. August 15, 2014.

The True Cost of Smart Grid Capabilities. Intelligent Utility. June 30, 2014.

Maximizing Customer Benefits: Performance Measurement and Action Steps for Smart Grid Investments. Public Utilities Fortnightly. January, 2012.

Buying Into Solar: Rewards, Challenges, and Options for Rate-Based Investments. Public Utilities Fortnightly. December, 2009.

Notable Presentations

NASUCA Annual Meeting. *Reinventing Distribution Planning in New Hampshire*. With D. Maurice Kreis, Executive Director, Office of Consumer Advocate. San Antonio, TX. November 19, 2019.

National Council on Electricity Policy Annual Meeting. Trainer on the economics of distribution grid interoperability and standard compliance; Presentation on communication network economics. Austin, TX. Sept 10-12, 2019.

NASUCA Annual Meeting. *Grid Modernization: Basic Technical Challenges Advocates Should Assert*. Orlando, FL. November 13, 2018.

Illinois Commerce Commission, NextGrid Working Group 7. *Using Peer Comparisons in Distributor Performance Evaluation*. Workshop 3 Presentation. Chicago, IL. July 30, 2018.

NARUC Committee on Electricity. *Using Peer Comparisons in Distributor Performance Evaluation*. Smart Money in Grid Modernization Panel Presentation. Scottsdale, AZ. July 16, 2018.

Public Utilities Commission of Ohio, Power Forward Proceeding Phase 2. *Getting a Smart Grid for FREE*. Columbus, Ohio. July 26, 2017.

NASUCA Mid-Year Meeting. *Using Performance Benchmarking to Gain Leverage in an "Infrastructure Oriented" Environment*. Denver, CO. June 6, 2017.

NARUC Committee on Energy Resources and the Environment. *How big data can lead to better decisions for utilities, customers, and regulators*. Washington DC. February 15, 2016.

National Conference of Regulatory Attorneys 2014 Annual Meeting. *Smart Grid Hype & Reality*. Columbus, Ohio. June 16, 2014.

NASUCA 2013 Annual Conference. *A Review and Synthesis of Research on Smart Grid Benefits and Costs*. Orlando, FL. November 18, 2013.

NARUC Subcommittee on Energy Resources and the Environment. *The Distributed Generation (R)Evolution*.

Orlando, FL. November 17, 2013.

IEEE Power and Energy Society, ISGT 2013. *Distribution Performance Measures that Drive Customer Benefits*. Washington DC. February 26, 2013.

Great Lakes Smart Grid Symposium. *What Smart Grid Deployment Evaluations are Telling Us*. Chicago. September 26, 2012.

Mid-Atlantic Distributed Resource Initiative. *Smart Grid Deployment Evaluations: Findings and Implications for Regulators and Utilities*. Philadelphia. April 20, 2012

DistribuTECH 2012. *Lessons Learned: Utility and Regulator Perspectives*. Panel Moderator. January 25.

DistribuTECH 2012. *Optimizing the Value of Smart Grid Investments*. Half-day course. January 23.

NARUC Subcommittee on Electricity. *Maximizing Smart Grid Customer Benefits: Measurement and Other Implications for Investor-Owned Utilities and Regulators*. St. Louis, MO. November 13, 2011.

Canadian Electric Institute 2013 Annual Distribution Conference. *The (Smart Grid) Story So Far: Costs, Benefits, Risks, Best Practices, and Missed Opportunities*. Toronto, Canada. January 23, 2011.

Teaching

Post-graduate Adjunct Professor. University of Colorado, Global Energy Management Program. Course: Renewable Energy Commercialization -- Electric Technologies, Markets, and Policy.

Guest Lecturer. Michigan State University, Institute for Public Utilities. Courses: Performance Measurement of Distribution Utility Businesses; Introduction to Grid Modernization.

Education

Master's Degree in Management, 1991, Kellogg School of Management, Northwestern University. Concentrations: Finance, Accounting, Information Systems, and International Business.

Bachelor's Degree in Business Administration, 1984, Kelley School of Business, Indiana University. Concentrations: Finance, Marketing.

Certifications

New Product Development Professional. Product Development and Management Association. 2007.

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-7, Sub 1214

Date of Request: January 16, 2020

Date of Response: January 27, 2020

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Confidential Responses are provided pursuant to Confidentiality Agreement

The attached response to NCJC Data Request No. 5-3, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

5-3. Refer to Oliver testimony, Exhibit 10. Provide the estimated useful life for each of the assets listed below:

- a. Page 47: Energy Storage Management System
- b. Page 47: Energy Storage Projects
- c. Page 51: Next Gen Cellular
- d. Page 51: Mission Critical Voice
- e. Page 51: POC
- f. Page 51: BizWAN
- g. Page 51: GridWAN
- h. Page 51: Mission Critical Transport
- i. Page 51: Towers/Shelters/Pow Sup
- j. Page 51: Network Asset Systems
- k. Page 51: Vehicle Area Network
- l. Page 52: Hydraulic to Electric Reclosers
- m. Page 52: Sys Intel and Monitoring
- n. Page 52: Fuse Replacement
- o. Page 52: UG Sys Automation
- p. Page 81: Enterprise Applications
- q. Page 82: Advanced Distribution Planning Tool
- r. Page 83: DER Dispatch Tool
- s. Page 84: Electric Transportation
- t. Page 85: Power Electronics for Volt-VAR Control
- u. Page 90: Substation Physical Security
- v. Page 90: Windows-based unit change outs
- w. Page 90: Device Entry Alert System
- x. Page 90: Secure Access Device Management
- y. Page 90: Line Device Protection

Response:

The list above are projects and not assets. This level of information is not available for the forecasted deferral. The depreciable lifespan of individual projects is not known prior to a project being placed in-service upon which time the capital cost for the project are unitized into the various plant FERC accounts based on the materials used. So, for the deferral estimate an estimated breakdown was made between Transmission, Distribution and General Plant spend. The average depreciation rate for each category was used.

• Distribution – 2.02% See Updated Depr Rates tab (meters were excluded from the average rate.) See Attachment CUCA 2-6 McManeus Grid Deferral Estimate

- Transmission– 2.23% See Updated Depr Rates tab. See Attachment CUCA 2-6
McManeus Grid Deferral Estimate



CUCA 2-6 McManeus
Grid Deferral Estimate

- Advanced DMS – 10% (10-year life)
- Communications– 10% (10-year life)
- Enterprise Application & Distributed Energy – 20% (5-year life)

All of this information was supplied under Public Staff DR 1.8

NC Retail ROEs Reported in E.S.-1 and Impacts of Potential Adjustments

Note: Adjustments are estimated at a high-level and may not be at the same level of precision as would be done in a rate case.

		Q1 2019		
		Income for Common Equity (in \$000)	Rate Base for Common Equity (in \$000)	Return on Common Equity
	<i>ES-1 Reference</i>	<i>Sched 1, Line 11, Col f</i>	<i>Sched 1, Line 11, Col c</i>	<i>Income for C.E./Rate Base for C.E.</i>
1	As Reported	737,546	7,304,749	10.10%
2	Adjust Equity Ratio to Last Approved	(606)	(16,818)	0.01%
3	Normalize Weather	(56,047)		-0.77%
4	Remove DSM/EE PPI Incentive	(23,449)		-0.32%
5	Adjust to End of Period Rate Base, including Interest Sync	(13,307)	400,166	-0.64%
6	Annualize Depreciation Expense, including adjustment to Reserve	(41,746)	(28,321)	-0.51%
8	Spread Severance Over 3 Years	41,733		0.54%
9	Adjusted	644,125	7,659,776	8.41%

Q2 2019		
Income for Common Equity (in \$000)	Rate Base for Common Equity (in \$000)	Return on Common Equity
<i>Sched 1, Line 11, Col f</i>	<i>Sched 1, Line 11, Col c</i>	<i>Income for C.E./Rate Base for C.E.</i>
777,069	7,516,016	10.34%
(974)	(27,043)	0.02%
(47,756)		-0.64%
(24,469)		-0.33%
(8,459)	254,377	-0.42%
(37,160)	(25,210)	-0.45%
41,755		0.54%
700,006	7,718,141	9.07%

Grid Improvement Plan Impacts without Deferral

2020 Revenue Requirements	(10,319)	132,246	-0.28%
2021 Revenue Requirements	(27,165)	335,682	-0.67%
2022 Revenue Requirements	(49,835)	584,120	-1.07%

(10,319)	132,246	-0.28%
(27,165)	335,682	-0.69%
(49,835)	584,120	-1.11%

DUKE ENERGY CAROLINAS LLC
E7 Sub 1214
NORTH CAROLINA RETAIL GRID IMPROVEMENT

DEC NC Summary Grid Impact

(000s)	<u>2020</u>	<u>2021</u>	<u>2022</u>
System CWIP Spend	442,845	580,407	702,957
NC Retail CWIP Spend	292,768	419,941	516,024
Cumulative In Service (Beg Feb 2020)	257,012	663,075	1,170,019
Accum Depr	<u>(2,693)</u>	<u>(17,534)</u>	<u>(46,712)</u>
Total Rate Base	254,318	645,541	1,123,307
O&M (Beg Jan 2020)	5,447	6,424	10,612
Depreciation (Beg Mar 2020)	2,693	14,840	29,178
Property Tax	-	666	1,717
Debt Return - Capital Asset	2,292	9,572	19,058
Debt Return - Deferred Balance	94	753	2,336
Equity Return - Capital Asset	7,033	29,377	58,488
Equity Return - Deferred Balance	288	2,311	7,171
Annual Deferral	<u>17,847</u>	<u>63,943</u>	<u>128,561</u>
Cumulative Balance Deferral Balance	17,847	81,790	210,351

[1] Based on lag time assumptions noted on Page 6.
[2] Per accounting.
[3] From page 6.

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E7 Sub 1214
NORTH CAROLINA RETAIL GRID IMPROVEMENT
2018 Test Year O&M

2018 O&M is a part of the rate case test period O&M. Therefore the amount eligible for deferral would be the O&M incurred above the amount included in the 2018 test period.

<u>2018 O&M incurred</u>	<u>2018</u>	<u>NC Retail</u>
Self Optimizing Grid	113,457 0.762817	86,547
Targeted Undergrounding	103,146 0.762817	78,682
Hardening & Resiliency	2,939 0.762817	2,242
Customer Delivery Hardening & Resiliency	9,513 0.762817	7,257
Enterprise Applications	4,596,836 0.747926	3,438,093
Advanced DMS	851,514 0.747926	636,869
Communications	864,296 0.747926	646,429
Transmission	-	-
Total	<u>6,541,701</u>	<u>4,896,119</u>

Distribution	174,727
Transmission	-
General	4,721,392

DEC Total Capital Spend				
Strategic Category [1]	2020	2021	2022	5-year Total
Advanced DMS	\$ 12	\$ 12	\$ 15	\$ 40
AMI	\$ -	\$ -	\$ -	-
Communication	\$ 36	\$ 48	\$ 55	139
Enterprise Applications	\$ 12	\$ 10	\$ 15	37
Hardening/Resiliency	\$ 47	\$ 26	\$ 79	152
Self Optimizing Grid	\$ 156	\$ 290	\$ 333	779
Targeted Underground	\$ 14	\$ 20	\$ 45	79
Distributed Energy	\$ 4	\$ 1	\$ 1	6
Transmission	\$ 161	\$ 174	\$ 159	494
Other	\$ -	\$ -	\$ -	-
				-
Total P/F Capital	\$ 443	\$ 580	\$ 703	\$ 1,726

DEC Total Capital Spend					NC Retail
SYSTEM	2020	2021	2022	3-year Total	Allocation [2]
ADMS	12.5	11.8	15.4	39.6	74.79%
Communication	36.1	48.0	54.7	138.7	74.79%
Enterprise Appliaction	12.0	9.9	15.2	37.1	74.79%
Distributed Energy	4.0	0.5	1.0	5.5	74.79%
Distribution NC	158.5	278.1	360.2	796.9	Direct
Distribution SC	56.5	62.5	83.1	202.2	
Transmission	163.2	169.6	173.4	506.2	52.66%
TOTAL	442.8	580.4	703.0	1,726.2	

DEC Total Installation O&M Spend				
Strategic Category [1]	2020	2021	2022	5-year Total
Advanced DMS	\$ 1	\$ 1	\$ 2	\$ 4
AMI	-	-	-	-
Communication	2	3	4	9
Enterprise Applications	5	4	6	15
Hardening/Resiliency	2	1	3	5
Self Optimizing Grid	2	4	5	11
Targeted Underground	0	0	0	1
Distributed Energy	0	0	0	0
Transmission	2	2	2	5
Other	-	-	-	-
				-
Total O&M	\$ 14	\$ 15	\$ 21	\$ 50

DEC Total Installation O&M Spend					NC Retail
SYSTEM	2020	2021	2022	3-year Total	Allocation [2]
ADMS	1.3	1.2	1.6	4.1	74.79%
Communication	2.4	3.2	3.6	9.2	74.79%
Enterprise Appliaction	4.9	4.1	6.2	15.2	74.79%
Distributed Energy	0.3	0.1	0.1	0.5	74.79%
Distribution NC	2.8	4.0	6.1	12.9	Direct
Distribution SC	1.0	1.0	1.5	3.5	
Transmission	1.6	1.7	1.6	4.9	52.66%
TOTAL	14.4	15.3	20.7	50.3	

DEC NC Retail Capital Spend				
DEC NC Retail	2020	2021	2022	3-year Total
ADMS	9.3	8.8	11.5	29.6
Communication	27.0	35.9	40.9	103.8
Enterprise Appliaction	9.0	7.4	11.3	27.8
Distributed Energy	3.0	0.4	0.8	4.1
Distribution NC	158.5	278.1	360.2	796.9
Distribution SC				-
Transmission	86.0	89.3	91.3	266.6
TOTAL	292.8	419.9	516.0	1,228.7

DEC NC Retail Installation O&M Spend				
DEC NC Retail	2020	2021	2022	3-year Total
ADMS	1.0	0.9	1.2	3.1
Communication	1.8	2.4	2.7	6.9
Enterprise Appliaction	3.7	3.0	4.6	11.4
Distributed Energy	0.2	0.0	0.1	0.3
Distribution NC	2.8	4.0	6.1	12.9
Distribution SC				-
Transmission	0.8	0.9	0.8	2.6
TOTAL	10.3	11.3	15.5	37.2

Plant in Service Assumptions [1]	
Distribution	1 month
Transmission	6 months
Communication	3 months
Advanced DMS & Enterprise Application	Annually in December

[1] System numbers and Plant in Service assumptions from Witness Oliver
[2] Allocation factors from the Cost of service study.

DUKE ENERGY CAROLINAS, LLC
North CAROLINA RETAIL GRID IMPROVEMENT

Mcmanus
Calculation of NC Retail Costs

Weighted Average Cost of Capital based on docket E-7 Sub 1146

Line No.	Description	Capital Structure (a)	Cost/Return (b)	Weighted Cost/Return (c)	Income Taxes Factor	After Tax Return	Income Taxes Factor	Revenue Requirement Excluding Gross Receipt Tax and Regulatory Fee	Combined Gross Receipts Tax and Regulatory Fee Factor	Revenue Requirement Including Gross Receipt Tax and Regulatory Fee
1										
2										
3	Long-term debt	48.0000% [1]	4.56% [2]	2.1884%	0.7664970	1.67742%	1.00000	2.18843%	99.62023%	2.19677%
4	Members' equity	52.0000% [1]	9.90% [2]	5.1480%	1.0000000	5.14800%	0.76650	6.71627%	99.62023%	6.74187%
5	Total (L3 + L4)	<u>100.0000%</u>		<u>7.3364%</u>		<u>6.8254%</u>		<u>8.9047%</u>		<u>8.9386%</u>
6										
7	Gross revenue				1.0000000					
8	State income tax rate (L36)				0.0297500					
9	Remainder (L14 - L15)				0.9702500					
10	Federal income tax rate				0.2100000					
11	Federal income tax (L16 x L17)				0.2037525					
12	State income tax rate (L36)				0.0297500					
13	Combined income tax rate (L18 + L19)				0.2335030					
14	1 minus combined income tax rate (1 - L20)				0.7664970					
15										
	Gross revenue				1.0000000					
	uncollectibles rate				0.0025010					
	Balance				0.9974990					
	Regulatory fee rate				0.0012967					
	Combined gross receipts tax and regulatory fee rate (L23 - L24 - L25)				0.9962023					
	State income tax (L15 x L26)				0.0296370					
	Balance (L26 - L27)				0.9665653					
	Federal income tax (L17 x L28)				0.2029787					
	Retention factor (L28 - L29)				0.7635866					
	State income tax rate									
	NC	0.0250000	67%	0.0167500						
	SC	0.0500000	26%	0.0130000						
				0.0297500						
					<u>0.2364134</u>					

DUKE ENERGY CAROLINAS
COMPARISON OF CURRENT AND PROPOSED DEPRECIATION PARAMETERS, RATES AND
ACCRUALS AS OF DECEMBER 31, 2018
VERSION 1 - REVISED

ACCOUNT		ORIGINAL COST	PROBABLE	SURVIVOR	CURRENT	CALCULATED		PROBABLE	SURVIVOR	NET	CALCULATED		INCREASE/ DECREASE
		AS OF	RETIREMENT		NET	ANNUAL ACCRUAL		RETIREMENT		SALVAGE	ANNUAL ACCRUAL		
		DECEMBER 31, 2018	DATE		SALVAGE	AMOUNT	RATE	DATE		PERCENT	AMOUNT	RATE	
(1)		(2)	(3)	(4)	(5)	(6)=(2)*(7)	(7)	(8)	(9)	(10)	(11)	(9)=(8)/(5)	(13)
302.00	FRANCHISES AND CONSENTS	10,582,513.97											
302.01	NPL FEASIBILITY	51,514.00											
303.00	MISCELLANEOUS INTANGIBLE PLANT	881,801,467.56											
303.10	MISCELLANEOUS INTANGIBLE PLANT - 10 YEAR	77,334,560.26											
303.02	NUCLEAR LICENSING	16,980,814.09											
310.00	LAND	26,928,990.69											
317.00	ARO	886,954,100.65											
320.00	LAND	2,084,901.52											
326.00	ARO	(333,080,604.95)											
330.00	LAND	28,756,791.34											
340.00	LAND	9,356,078.64											
347.00	ARO	14,776,081.47											
350.00	LAND	33,315,866.21											
360.00	LAND	54,389,762.82											
389.00	LAND	62,366,844.64											
399.00	ARO	(931,335.11)											
TOTAL NONDEPRECIABLE PLANT		1,771,668,347.80											
ACCOUNTS NOT STUDIED													
352.99	STRUCTURES AND IMPROVEMENTS - IMPAIRMENT	(4,692,470.50)											
353.99	STATION EQUIPMENT - IMPAIRMENT	(9,531,580.93)											
354.99	TOWERS AND FIXTURES - IMPAIRMENT	(146,639.71)											
355.99	POLES AND FIXTURES - IMPAIRMENT	(146,639.63)											
356.99	OVERHEAD CONDUCTORS AND DEVICES - IMPAIRMENT	(146,639.68)											
TOTAL ACCOUNTS NOT STUDIED		(14,663,970.45)											
TOTAL ELECTRIC PLANT		52,573,372,308.87				1,343,742,881				1,458,084,379		109,738,272	

* Curve shown is interim survivor curve. Each facility in the account is assigned an individual probable retirement year.
** Annual Accrual Amount calculated based on remaining amortization period of 14.58 years (August 2033 which is 15 years from implementation).
*** 5 year Amortization of Adjusted Reserve related to implementation of Amortization Accounting.

= Provided in Melissa A.'s 5-2-2019 email
 = Used the Ordered Projected Rates from 2016 Depr Study.

Duke Energy Carolinas, LLC
Docket No. E-7, Sub 1214
Annualize retail revenues for current rates
For the test period ended December 31, 2018

NC-0104
Page 1 of 1
Application

2018 Calculation of Tax Rates

Current (Statutory) Tax Rate Per "Provision" - Year 2019

Line No.	Description	Total	Statutory Rate (a)	Allocation Factor (b)	Composite Rate (a) x (b)
1					
2		100.0000%			
3	North Carolina	1.6750%	2.50%	67.0000%	1.67500%
4	South Carolina	1.3000%	5.00%	26.0000%	1.30000%
5	Federal Taxable Income (L2 - L3 - L4)	97.0250%			
6	Federal Tax Rate	21.0000%			
7	Federal Net of State (L5 x L6)	20.3753%			
8	North Carolina (L3)	1.6750%			
9	South Carolina (L4)	1.3000%			
10	Composite Tax Rate (L7 + L8 + L9)	23.3503%			

Source: Duke Energy Carolinas Tax Department

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Feb 18 2020

Duke Energy Carolinas, LLC
Docket No. E-7, Sub 1214
Annualize property taxes on year end plant balances
For the test period ended December 31, 2018
(Dollars in thousands)

NC-0901
Page 1 of 1

Line No.	Description	State - NC	State - SC	
1	12/31/2017 System Balances Subject to Property Tax			
2	Utility Plant (101-106, 114)	\$ 38,269,626 [1]	\$ 38,269,626 [1]	
3	Less: Asset Retirement Obligations	(198,027) [2]	(198,027) [2]	
4	Construction Work in Progress (107)	2,610,346 [1]	- [3]	
5	Net Nuclear Fuel (120.1-5)	842,653 [1]	- [3]	
6	Fuel Stock (151)	229,301 [1]	- [3]	
7	Materials & Supplies (154)	474,672 [4]	222,870 [4]	
8	Store Expenses Undistributed (163) [M & S Burdens]	24,528 [4]	19,892 [4]	
9	Other Materials & Supplies (156)	66 [4]	5 [4]	
10	Property Subject to Property Tax (Sum L2 through L8)	\$ 42,253,166	\$ 38,314,366	
11				
12	2018 Property Tax Expense Paid	\$ 90,787 [5]	\$ 117,894 [6]	Combined
13	Average Property Tax Rate (L12 / L10)	0.21486%	0.30770%	0.259%
14				
15	12/31/2018 System Balances Subject to Property Tax			
16	Utility Plant (101-106, 114)	\$ 41,161,863 [1]	\$ 41,161,863 [1]	
17	Less: Asset Retirement Obligations	(567,718) [2]	(567,718) [2]	
18	Construction Work in Progress (107)	1,632,658 [1]	- [3]	
19	Net Nuclear Fuel (120.1-5)	814,296 [1]	- [3]	
20	Fuel Stock (151)	220,761 [1]	- [3]	
21	Plant Materials & Operating Supplies (154)	464,250 [7]	217,976 [7]	
22	Store Expenses Undistributed (163) [M & S Burdens]	24,952 [7]	20,236 [7]	
23	Other Materials & Supplies (156)	96 [7]	8 [7]	
24	Property Subject to Property Tax (Sum L16 through L22)	\$ 43,751,062	\$ 40,832,357	
25				
26	Average Property Tax Rate (L13)	0.21486%	0.30770%	
27	Annualized Property Tax Expense (L24 x L26)	\$ 94,005	\$ 125,641	
28				
29	Test Year Property Tax Expense (Excluding Deferrals) (L12)	\$ 90,787	\$ 117,894	
30	Property Tax Expense Adjustment (L27 - L29)	\$ 3,218	\$ 7,748	
31				
32	Total Property Tax Adjustment (NC Col. L30 + SC Col. L30)	\$ 10,966		
33	Allocation Factor - Gross Plant	68.3083% [8]		
34	Impact to general taxes (L32 x L33)	\$ 7,491		
35	Statutory tax rate	23.3503% [9]		
36	Impact to income taxes (-L34 x L35)	\$ (1,749)		
37	Impact to operating income (-L34 - L36)	\$ (5,742)		

[1] NC-0902 - FERC Form 1, Comparative Balance Sheet, Page 110, Lines 2, 3, 13, and 45

[2] NC-0903 - Asset Retirement Obligations

[3] There is no property tax applied for these items in SC - Per DEC Property Tax Department

[4] NC-0904 - Duke Energy Carolinas - Materials and Supplies - By State, Line 16, Line 17 and Line 18

[5] NC-0905 - 2018 - Property Tax Expense - NC, Col. (b) + Col. (c)

[6] NC-0906 - 2018 - Property Tax Expense - SC, Col. (a)

[7] 2018 FERC 154, 156 and 163 accounts are spread across NC and SC based on 2017 distribution.

[8] COSS NC retail percentage of gross plant in service

[9] NC-0104 - 2019 Calculation of Tax Rates - Statutory Tax Rate, Line 10

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Feb 18 2020

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 8**

Docket No. E-7, Sub 1214

Date of Request: January 31, 2020

Date of Response: February 11, 2020

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The attached response to NCJC Data Request No. 8-24, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning and Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

8-24. Refer to DEC's targeted undergrounding program generally.

- a. How many miles of residential "Backyard" overhead lines does DEC estimate it has today?
- b. What percentage of the miles DEC proposes to underground in its proposed targeted undergrounding program are shared with telecom, internet, or cable TV providers?

Response:

- a) The amount is not quantifiable using GIS attributes
- b) We have assumed all, although there will be exceptions

**Duke Energy Progress
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-2, Sub 1219

**Date of Request: January 31, 2020
Date of Response: February 10, 2020**

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The attached response to NCJC Data Request No. 5-22, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Progress

Request:

5-22. Refer to DEP's targeted undergrounding program generally.

- a. How many miles of residential "Backyard" overhead lines does DEP estimate it has today?
- b. What percentage of the miles DEC proposes to underground in its proposed targeted undergrounding program are shared with telecom, internet, or cable TV providers?

Response:

- a) The amount is not quantifiable using GIS attributes
- b) We have assumed all, although there will be exceptions

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 8**

Docket No. E-7, Sub 1214

Date of Request: January 31, 2020

Date of Response: February 10, 2020

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The attached response to NCJC Data Request No. 8-1, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning and Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

8-1. Refer to forthcoming responses from DEC for NCJC DRs 6-08 and 6-09.

- a. How many miles of 44kV does DEC have today?
- b. How many miles of 44kV upgrades will deliver a capacity increase, and to what capacity?
- c. How many distribution circuits does DEC have? DEP?

Response:

- a. Approximately 2,800 miles
- b. In the 3-year Grid Improvement Plan there are no capacity increase projects associated with the 44kV rebuilds. 44kV line rebuilds in the 3-year plan total approximately 80 miles and are all driven by reliability improvements, these rebuilds will reduce the probability of circuit failures that could result in customer outages. This work is all part of Phase I as described in Oliver Exhibit 4 page 36. These 44kV circuits are rebuilt to 100kV standards with regards to structure design, insulation level, and conductor sizing. There is no timeline established for Phase II, voltage conversions to 100kV, which would deliver the capacity increase.
- c. DEC NC has 2,093 circuits as of November 2019.
DEP NC has 1,077 circuits as of November 2019.

**Duke Energy Progress
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-2, Sub 1219

**Date of Request: January 31, 2020
Date of Response: February 10, 2020**

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The attached response to NCJC Data Request No. 5-1, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Progress

Request:

- 5-1. Refer to forthcoming responses from DEC for NCJC DRs 6-08 and 6-09.
- a. How many miles of 44kV does DEP have today?
 - b. How many miles of 44kV will be upgraded, and to what capacity, in DEP if the current GIP is approved?

Response:

- a. 0 miles. Voltages in the DEP Transmission system are 230kV, 115kV, and 69kV.
- b. N/A

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 8**

Docket No. E-7, Sub 1214

Date of Request: January 31, 2020

Date of Response: February 10, 2020

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The attached response to NCJC Data Request No. 8-26, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning and Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

8-26. Refer to DEC's response to NCJC DR 5-49, which states "in the past 5 years in the DEC system there have been 88,739 customer outages totaling 18,442,020 customer minutes interrupted as a result of transformer equipment failures."

- a. How many individual distribution transformer failures are represented in these statistics?
- b. How many distribution transformers does DEC have?
- c. How many individual transmission transformer failures are represented in these statistics?
- d. How many transmission transformers does DEC have?

Response:

Note, in answering the question Duke Energy assumed it related to substation transformer banks. "Distribution" would be T to D banks and "Transmission" would be T to T banks. Upon re-running the query from the Transmission Reliability Reporting System it was identified that the original numbers provided in DR 5-49 were incorrect and lower than actual. Updated numbers applicable to DR 5-49: in the past 5 years in the DEC system there have been 157,682 customer outages totaling 36,134,492 customer minutes interrupted as a result of transformer equipment failures. The below responses are associated with these updated numbers.

- a. Individual transformer assets are not tracked to specific outages in the Transmission Reliability Reporting System, although there were 57 unique events that comprised the above-mentioned customer interruptions and customer minutes interrupted. 35 of these events are associated with distribution class transformers.
- b. DEC has approximately 4,500 distribution class substation transformers
- c. Individual transformer assets are not tracked to specific outages in the Transmission Reliability Reporting System, although there were 57 unique events that comprised the above-mentioned customer interruptions and customer minutes interrupted. 22 of these events are associated with transmission class transformers.
- d. DEC has approximately 400 transmission class substation transformers

**Duke Energy Progress
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-2, Sub 1219

**Date of Request: January 31, 2020
Date of Response: February 10, 2020**

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The attached response to NCJC Data Request No. 5-17, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Progress

Request:

5-17. Refer to DEP's response to NCJC DEP DR 2-16(c), which states "in the past 5 years in the DEP system there have been 290,450 customer outages totaling 28,539,477 customer minutes interrupted as a result of transformer equipment failures."

- a. How many individual distribution transformer failures are represented in these statistics?
- b. How many distribution transformers does DEP have?
- c. How many individual transmission transformer failures are represented in these statistics?
- d. How many of transmission transformers does DEP have?

Response:

For this response, it is assumed that "distribution transformer" refers to a substation T to D bank, and "transmission transformer" refers to a substation T to T bank.

- a. Individual transformer assets are not tracked to specific outages in the Transmission Reliability Reporting System, although there were 65 unique events that comprised the above-mentioned customer interruptions and customer minutes interrupted. 56 of these events are associated with distribution class transformers.
- b. DEP has approximately 900 distribution class substation transformers
- c. Individual transformer assets are not tracked to specific outages in the Transmission Reliability Reporting System, although there were 65 unique events that comprised the above-mentioned customer interruptions and customer minutes interrupted. 9 of these events are associated with transmission class transformers.
- d. DEP has approximately 117 transmission class substation transformers

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 8**

Docket No. E-7, Sub 1214

Date of Request: January 31, 2020

Date of Response: February 11, 2020

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The attached response to NCJC Data Request No. 8-25, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning and Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

8-25. Refer to DEC's response to NCJC DR 5-44, which states "in the past 5 years in the DEC system there have been 77,515 customer outages totaling 8,642,573 customer minutes interrupted as a result of breaker equipment failures."

- a. How many individual distribution breaker failures are represented in these statistics?
- b. How many distribution breakers does DEC have?
- c. How many of DEC's distribution breakers are oil filled?
- d. How many individual transmission breaker failures are represented in these statistics?
- e. How many transmission breakers does DEC have?
- f. How many of DEC's transmission breakers are oil filled?

Response:

Upon re-running the query from the Transmission Reliability Reporting System it was identified that the original numbers provided in DR 5-44 were incorrect and lower than actual. Updated numbers applicable to DR 5-44: in the past 5 years in the DEC system there have been 123,103 customer outages totaling 11,242,664 customer minutes interrupted as a result of breaker equipment failures. The below responses are associated with these updated numbers.

- a. Individual breaker assets are not tracked to specific outages in the Transmission Reliability Reporting System, although there were 50 unique events that comprised the above-mentioned customer interruptions and customer minutes interrupted. 37 of these events are associated with distribution class breakers.
- b. DEC has approximately 4,600 distribution class substation breakers
- c. DEC has approximately 1,500 distribution class substation oil breakers
- d. Individual breaker assets are not tracked to specific outages in the Transmission Reliability Reporting System, although there were 50 unique events that comprised the above-mentioned customer interruptions and customer minutes interrupted. 13 of these events are associated with transmission class breakers.
- e. DEC has approximately 3,400 transmission class substation breakers
- f. DEC has approximately 2,000 transmission class substation oil breakers

**Duke Energy Progress
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-2, Sub 1219

**Date of Request: January 31, 2020
Date of Response: February 10, 2020**

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The attached response to NCJC Data Request No. 5-16, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Progress

Request:

5-16. Refer to DEP's response to NCJC DEP DR 2-15 (g), which states "in the past 5 years in the DEP system there have been 46,085 customer outages totaling 2,549,341 customer minutes interrupted as a result of breaker equipment failures."

- a. How many individual distribution breaker failures are represented in these statistics?
- b. How many of these distribution breakers were oil-filled?
- c. How many distribution breakers does DEP have?
- d. How many oil-filled distribution breakers does DEP have?
- e. How many individual transmission breaker failures are represented in these statistics?
- f. How many of these transmission breakers were oil filled?
- g. How many transmission breakers does DEP have?
- h. How many oil-filled transmission breakers does DEP have?

Response:

- a. Individual breaker assets are not tracked to specific outages in the Transmission Reliability Reporting System, although there were 8 unique events that comprised the above-mentioned customer interruptions and customer minutes interrupted. 5 of these events are associated with distribution class breakers.
- b. Individual breaker assets are not tracked to specific outages in the Transmission Reliability Reporting System, therefore it is unknown how many of these breakers were oil-filled.
- c. DEP has approximately 1,700 distribution class substation breakers
- d. DEP has approximately 800 distribution class substation oil breakers
- e. Individual breaker assets are not tracked to specific outages in the Transmission Reliability Reporting System, although there were 8 unique events that comprised the above-mentioned customer interruptions and customer minutes interrupted. 3 of these events are associated with transmission class breakers.
- f. Individual breaker assets are not tracked to specific outages in the Transmission Reliability Reporting System, therefore it is unknown how many of these breakers were oil-filled.
- g. DEP has approximately 940 transmission class substation breakers
- h. DEP has approximately 350 transmission class substation oil breakers

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 2**

Docket No. E-7, Sub 1214

Date of Request: December 30, 2019

Date of Response: January 9, 2020

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The attached response to NCJC Data Request No. 2-5, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

NCJC
Data Request No. 2
DEC Docket No. E-7, Sub1214
Item No. 2-5
Page 1 of 1

Request:

2-5. Please refer to DEC's responses to NCSEA DR 2-19, which indicates that the physical security of substations will be upgraded at a rate of 11-13 per year.

- How many substations does DEC have in North Carolina?
- Which ones will be upgraded in the proposed 3-year Grid Improvement Plan period?
- How many substations does DEP have in North Carolina?
- Which ones will be upgraded in the proposed 3-year Grid Improvement Plan period?
- How did (or how will) DEC and DEP (collectively, "Duke") go about prioritizing and selecting substations for physical security upgrades?
- How did Duke come to determine the \$110 million budget for physical substation security upgrades? How does the value of this spending compare to the value to be delivered by other types of spending in the Grid Improvement Plan? How does Duke know it shouldn't spend less on substation security and more on other investments, or more on substation security and less on other investments?

Response:

- 1759 in DEC NC
- 12
- 356 in DEP NC
- 15
- The Transmission Security Working Group determined the physical security requirements needed for substations that fell into the tiering for CIP-014 compliance, Tier 1 and Tier 2 classifications.
- Duke Energy Transmission determined the \$110M budget based on a threat and vulnerability assessment as well as the prioritization of the sites based on CIP-014, Tier 1 and Tier 2 classifications. Each project and program contained in the Grid Improvement Plan has unique and complementary value that address the megatrends described in witness Oliver testimony and Exhibits. The rate of investment mix contained within the Grid Improvement Plan was informed by Company experts and input from stakeholders.

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-7, Sub 1214

Date of Request: January 16, 2020

Date of Response: January 27, 2020

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The attached response to NCJC Data Request No. 5-4, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

- 5-4. Refer to the Oliver testimony regarding the Grid Improvement Plan generally.
- For what Grid Improvement Plan capital amount, over what years, is Duke requesting approval from the North Carolina Utilities Commission?
 - Is Duke requesting approval from the NCUC for 2019 Grid Improvement Plan capital spending in this rate case? If so, please provide amounts and detail by program, as well as where the total can be found in test year adjustments or other rate case detail.
 - Is Duke requesting approval from the NCUC for Grid Improvement Plan capital spending beyond 2022?
 - Explain how Duke intends to secure approval to recover a return of and on Grid Improvement Plan capital spending beyond 2022.
 - If Duke is not requesting approval for spending beyond 2022, explain why several benefit-cost analyses include benefits for capital spending beyond 2022.

Response:

- Refer to attachment PS DR 36-3 for the GIP capital investments included in the current rate request. The amount is subject to update through January 31, the capital cut-off date for this case. Additionally, Duke is requesting deferral accounting for 2020 -2022 GIP capital assets placed in service until they can be requested for recovery in the next rate case.
- See a. above.
- No
- This has not been determined.
- The GIP CBA's used a 30-year evaluation period for the 3-year capital investment. The exception being DEC IVVC as it has an estimated deployment timeframe of 4 years.

**Duke Energy Carolinas
Response to
North Carolina Sustainable Energy Association Data Request
Data Request No. NCSEA 2**

Docket No. E-7, Sub 1214

Date of Request: November 18, 2019

Date of Response: November 25, 2019

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The attached response to NCSEA Data Request No. 2-52, was provided to me by the following individual(s): Karen Ann Ralph, Senior Financial Analyst, Distribution Finance - Carolinas, and was provided to NCSEA under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

52. Refer to Oliver Exhibit 10, page 50 (Enterprise Communications). Regarding “Mission Critical Voice” capital spending of \$52.5 million:
- Describe the existing Land Mobile Radio systems in place for DEC.
 - Describe any shortcomings associated with these systems.
 - Explain how the new system will avoid any shortcomings described.
 - Provide any analysis the Company completed comparing the cost of cellular service over the public cellular network to a new, proprietary voice network. If the Company has not completed such an analysis, please explain why not.

Response:

[Note: Clarification, the \$52.5 million referenced in the question is for both DEC-NC and DEP-NC together; the correct value for just DEC-NC is \$10.3 million]

- The existing DEC Land Mobile Radio (LMR) system is a 2008 Harris Opensky 800MHz trunked-radio platform.
- The existing Harris Opensky trunked-radio system will not be compatible with Duke Energy’s enterprise wide communications strategy that is meant to migrate all jurisdictions onto a single LMR platform and improve operational excellence.
- This platform provides enterprise wide interoperability, improves reliability, sustainability and portability.
- A cost comparison of cellular services over the public cellular network was not performed. Cellular carriers could not meet the minimum requirements for mission critical communications.

**Duke Energy Carolinas
Response to
North Carolina Sustainable Energy Association Data Request
Data Request No. NCSEA 2**

Docket No. E-7, Sub 1214

Date of Request: November 18, 2019

Date of Response: November 25, 2019

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The attached response to NCSEA Data Request No. 2-53, was provided to me by the following individual(s): Karen Ann Ralph, Senior Financial Analyst, Distribution Finance - Carolinas, and was provided to NCSEA under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

53. Refer to Oliver Exhibit 10, page 50 (Enterprise Communications). Regarding “Mission Critical (data) Transport” capital spending of \$107.1 million:
- Describe the existing (data) transport network.
 - Provide the annual operations and maintenance cost associated with the existing (data) transport network.
 - Describe any shortcomings associated with these systems.
 - Provide details regarding all the various upgrades anticipated, the locations and counts of each upgrade, and the cost of each upgrade such that the total equals \$107.1 million.
 - Provide any analysis the Company completed comparing the cost of its proposed (data) Transport upgrades to other alternatives, including the use of new 4G LTE and Cat M-1 networks now available from public carriers. If the Company has not completed such an analysis, explain why not.

Response:

- The Duke Energy (data) transport network is comprised of many components of various technologies. These include fiber, optical electronics, data management and routing platforms, as well as microwave and wireless technologies.

b.

RU	O&M
DEC	\$21,700,431
DEP	\$15,119,010

- c. Aging physical infrastructure and technological advances have rendered many of the existing data transport platforms obsolete, with most no longer supported by vendors.

d. Data networks are systems comprised of multiple, various components; details regarding final locations and counts are subject to final engineering and design completion, which may occur once approved. The primary transport networks types, site counts and associated cost are included below. Specific location information about communications infrastructure of any kind is generally limited or not publicly available due to security concerns, from both physical and cyber perspectives.

NCSEA
Data Request No. 2
DEC Docket No. E-7, Sub 1214
Item No. 2-53
Page 2 of 2

DEC		
Site count	Technology	Cost
204	Microwave	\$ 14,100,000
29	Fiber	\$ 49,450,000
7	MAS Cambium	\$ 750,000

Region total \$ 64,300,000

DEP		
Site count	Technology	Cost
26	Microwave	\$ 1,800,000
17	Fiber	\$ 33,910,000
62	MAS Cambium	\$ 7,100,000

Region total \$ 42,810,000

Program total \$107,110,000

Alternatives like 4G LTE and Cat M-1 do not have the capacity nor can they satisfy mission critical requirements to support an enterprise core data network. Given the inability to meet the requirements a cost analysis wasn't performed.

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[illegible]

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	Source	
Self-Optimizing Grid																																	
DEC	-	23,289	65,005	190,110	2,221,548	409,125	409,469	514,657	628,598	1,006,095	1,012,559	411,319	411,718	412,126	537,161	672,605	1,121,291	1,128,851	414,326	414,799	415,284	563,911	724,911	1,258,312	1,267,455	417,899	418,462	419,039	595,711	702,941	732,729	SOG_DEC_NC_19-22_vf_rev8 9-2-19.xlsx; tab "DEC North Carolina_SOG"; line 25 (Total O&M)	
DEP	-	9,274	85,879	108,828	136,147	323,341	323,577	365,567	602,160	661,573	707,160	324,845	325,118	325,398	375,311	656,551	727,133	781,247	326,906	327,230	327,563	386,893	721,197	805,149	869,573	329,355	329,741	330,136	400,662	762,201	603,144	SOG_DEP_NC_19-22_vf_rev8 9-2-19.xlsx; tab "DEP North Carolina_SOG"; line 25 (Total O&M)	
Integrated Volt-VAR Control	-	1,073,108	3,209,001	3,321,881	3,143,520	3,524,838	3,737,059	3,952,553	4,168,963	4,387,872	4,572,842	4,721,124	4,783,182	4,846,761	4,911,991	4,978,821	5,047,322	5,117,535	5,189,503	5,263,271	5,338,882	5,416,384	5,495,824	5,577,250	5,660,711	5,746,259	-	-	-	-	-	IVVC_DEC_NC_Only_19-23_vf_rev2 7-12-19.xlsx; tab "DEC-NC IVVC"; line 29 (Total O&M)	
DSDR	20,000	20,000	21,000	21,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	DSDR_DEC_NC_Only_19-21_vf 5-6-19.xlsx; tab "DSDR"; line 28
Transmission H&R																																	
DEC Line Projects (18.7% SC removed)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Trans_Line Projects_DEC_NC-SC_19-21_multiple_vf_rev2 7-28-19.xlsx & NCIC DR DEC x-xx
DEP Line Projects (9.3% SC removed)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Trans_Line Projects_DEP_NC-SC_19-21_multiple_vf_rev2 7-28-19.xlsx & NCIC DR DEP x-xx
DEC Rebuilds (18.7% SC removed)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Trans_44kV Rebuilds_DEC_NC-SC_19_multiple_vf 1-26-19.xlsx & NCIC DR DEC x-xx
DEP Rebuilds (9.3% SC removed)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Trans_Line Rebuilds_DEP_NC-SC_19_multiple_vf 2-19-19.xlsx & NCIC DR DEP x-xx
Substation Flooding (SC7)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Trans_Flood Sub_Reinforce_DEP_NC-SC_19-20_All Program_vf 5-3-19 & NCHC DR DEP x-xx
Transmission H&R: NC Only	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Substation Flooding – Whiteville Relo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Trans_Flood Sub_Rebuild_DEP_NC-SC_22_Whiteville_vf_rev1 7-17-19.xlsx & NCIC DR DEP x-xx
Targeted Undergrounding	231,081	424,333	1,001,167	1,821,590	1,450,840	819,083	459,417	367,936	377,135	276,780	283,699	290,792	298,062	305,513	313,151	320,980	329,004	337,229	345,660	354,302	363,159	372,238	381,544	391,083	400,860	410,881	421,153	431,682	442,474	453,536	464,874	TUG_DEC-DEP_NC_19-22_Consolidated_vf_rev1 8-9-19.xlsx; tab "All Years Summary"; line 20 (O&M).	
Energy Storage																																	
Distribution Trans Retrofit	946,827	1,095,469	1,618,469	1,867,878	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	HR_Transformer Retro_DEC-DEP_NC_19-22_vf_rev2 8-2-19.xlsx; tab "NPV - Tx Retrofit NC"; line 22 (Program O&M only)
Long Duration/High Impact Sites	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	LDI_DEC-DEP_NC_2019-2022_Summary_v1_rev1 7-9-19.xlsx; tab "2019-2022 Summary"
Transformer Bank Replacement																																	
DEC total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	27	Trans_Transformer Bank_DEC_NC-SC_19-22_vf_rev3 8-2-19.xlsx; tab "NPV"; cells D18-G18
Less: DEC SC (18.3%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	27	NCIC DR DEC x-xx
DEC NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DEP total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	27	Trans_Transformer Bank_DEP_NC-SC_19-22_vf_rev3 8-2-19.xlsx; tab "
Less: DEP SC (9.3%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	27	NCIC DR DEP x-xx
DEP NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oil Breaker Replacements																																	
DEC total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	27	Trans_Oil Breaker_DEC_NC-SC_19-22_vf_rev3 8-2-19.xlsx; tab "NPV"; cells D18-G18
Less: DEC SC (18.3%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	27	NCIC DR DEC x-xx
DEC NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DEP total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	27	Trans_Oil Breaker_DEP_NC-SC_19-22_vf_rev3 8-2-19.xlsx; tab "NPV"; cells D18-G18
Less: DEP SC (9.3%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	27	NCIC DR DEP x-xx
DEP NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Modernize																																	
Enterprise Communications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Oliver Exh. 10, page 3 (GIP Capital Budget Summary, NC Budget)
Dist Auto	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Oliver Exh. 10, page 3 (GIP Capital Budget Summary, NC Budget)
Transmission System Intelligence	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Oliver Exh. 10, page 3 (GIP Capital Budget Summary, NC Budget)
Enterprise Applications	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Oliver Exh. 10, page 3 (GIP Capital Budget Summary, NC Budget)
Integrated Systems Operation Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Oliver Exh. 10, page 3 (GIP Capital Budget Summary, NC Budget)
DER Dispatch Tool	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Oliver Exh. 10, page 3 (GIP Capital Budget Summary, NC Budget)
Electric Transportation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Oliver Exh. 10, page 3 (GIP Capital Budget Summary, NC Budget)
Power Electronics for Volt/VAR Control	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Oliver Exh. 10, page 3 (GIP Capital Budget Summary, NC Budget)
Physical & Cyber Security	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	27	Oliver Exh. 10, page 3 (GIP Capital Budget Summary, NC Budget)
TOTALS	1,197,908	2,645,472	6,000,521	7,331,287	6,952,054	5,076,388	4,929,521	5,200,713	5,776,856	6,332,320	6,576,261	5,748,080	5,818,079	5,889,829	6,137,614	6,628,957	7,224,750	7,364,862	6,276,394	6,359,602	6,444,889	6,739,427	7,323,476	8,031,794	8,198,598	6,904,394	1,169,356	1,180,857	1,438,848	1,918,808	1,800,883		

9,108,273,177	TOTAL Revenue requirement over 30 years
2,771,527,226	TOTAL return on equity over 30 years

Opening Balance	20,357,427	19,678,846	19,000,266	18,321,685	17,643,104	16,964,523	16,285,942
Depreciation (30 years)	678,581	678,581	678,581	678,581	678,581	678,581	678,581
Closing Balance	19,678,846	19,000,266	18,321,685	17,643,104	16,964,523	16,285,942	15,607,361
2044 Assets – 30 year							
Opening Balance		6,889,842	6,660,181	6,430,519	6,200,858	5,971,196	5,741,535
Depreciation (30 years)		229,661	229,661	229,661	229,661	229,661	229,661
Closing Balance		6,660,181	6,430,519	6,200,858	5,971,196	5,741,535	5,511,874
2047 Assets – 5 year							
Opening Balance					77,761,831	62,209,465	46,657,099
Depreciation (5 years)					15,552,366	15,552,366	15,552,366
Closing Balance					62,209,465	46,657,099	31,104,733

RELIABILITY	Residential	Small C&I	Large C&I	Not Defined	Total Reliability	ASSETS	Energy & Demand	O&M	Emissions (CO2)	TOTAL PRIMARY	Oliver Exh. 8
TUG	30,213,660	374,938,080	1,476,355,783	4,959,802	1,886,467,325	47,287,983			107,410,608	2,041,165,916	2,041,165,916
Transformer Retrofit	7,172,999	149,957,793	82,802,426		239,933,218				10,071,665	250,004,883	250,004,884
IVVC					-		359,982,087		100,266,070	546,504,878	546,504,878
DSDR					-		192,539,000		16,619,000	266,350,000	232,348,694
SOG - DEC	46,986,086	623,932,977	379,618,459		1,050,537,522		78,997,663			1,129,535,185	1,129,535,184
SOG - DEP	46,312,439	739,265,853	139,399,592		924,977,884		34,251,650			959,229,534	959,229,534
DEP Oil Breaker Replacements	4,452,812	25,111,390	50,624,840		80,189,042	40,183,659				120,372,701	54,341,285
DEC Oil Breaker Replacements	4,132,045	27,771,507	12,178,530		44,082,082	15,833,130				59,915,212	97,863,006
DEP Trans Bank Replacements	1,790,862	4,141,082	1,340,491		7,272,435	29,355,623				36,628,058	33,221,648
DEC Trans Bank Replacements	2,493,132	7,434,531	4,521,460		14,449,123	14,102,246				28,551,369	23,212,261
Substation Flooding -- Reinforce					-	21,817,816	-	-		21,817,816	19,788,759
LDI/HIS	16,226,891	720,539,386	1,122,837,611		1,859,603,888	-	-	-		1,859,603,888	1,859,603,889
substation Relo -- Whiteville	1,110,580	375,873			1,486,453	4,964,803				6,451,255	5,851,288
Trans -- DEP line projects (less 9.7% SC)				88,673,349	88,673,349					88,673,349	89,066,144
Trans -- DEC line projects (less 18.3% SC)				1,908,658,683	1,908,658,683					1,908,658,683	1,899,313,965
Trans Upgrades -- DEP (less 9.7% SC)				14,453,127	14,453,127					14,453,127	
Trans Upgrades -- DEC (less 18.3% SC)				192,555,597	192,555,597					192,555,597	
TOTALS	160,891,506 2.64%	2,673,468,472 43.80%	3,269,679,192 53.57%	2,209,300,559	8,313,339,729	173,545,259	665,770,400	234,367,343	143,448,721	9,530,471,452	9,241,051,335
Reliability Benefits as a % of Total:					87.2%						

Program/Sub-Component	Present Value	2027	2032	2037	2042	2047
ADMS (Self-Optimizing Grid)	53,722,192	-	62,369,028	-	79,837,629	-
Enterprise Communications	233,553,437	-	271,144,948	-	347,088,457	-
Enterprise Applications	78,380,613	31,506,325	35,646,514	40,330,759	45,630,552	51,626,781
ISOP Programs	18,717,674	7,523,865	8,512,562	9,631,183	10,896,799	12,328,728
DER Dispatch Tool	20,960,980	8,425,597	9,532,790	10,785,476	12,202,777	13,806,322
Total	405,334,895	47,455,786	387,205,842	60,747,418	495,656,214	77,761,831

Oliver Exh. 10 Capital Detail NC ONLY											Capital \$ per Oliver Exh. 10 (in millions)	Suggested Adjustments	Capital \$ per NCJC/NCSEA If GIP Not Rejected
		DEC			DEP			TOTAL			GIP TOTAL		Program/Subcomponent
	2020	2021	2022	2020	2021	2022	2020	2021	2022				
TOTALS	326,766,615	454,473,324	550,147,959	227,735,103	331,467,788	428,638,211	554,501,718	785,941,112	978,786,170	2,319,229,000			
Self-Optimizing Grid (Total)	90,604,000	153,733,000	175,802,000	61,528,000	86,057,000	154,752,000	152,132,000	239,790,000	330,554,000	722,476,000			
Fixed Costs (ADMS and POC)	9,417,344	8,853,752	11,516,811	6,017,683	5,657,754	7,410,399	15,435,027	14,511,506	18,927,210	48,873,743			
Variable Costs (segments/capacity/conn)	81,186,656	144,879,248	164,285,189	55,510,317	80,399,246	147,341,601	136,696,973	225,278,494	311,626,790	673,602,257			
Integrated Volt-VAR Control (total)	30,797,000	86,311,000	89,550,000	-	5,000,000	5,000,000	30,797,000	91,311,000	94,550,000	216,658,000			
Transmission H & R (Total)	13,985,730	20,417,670	68,058,900	8,933,625	9,568,905	12,785,010	22,919,355	29,986,575	80,843,910	133,749,840			
Line H&R (Trans + Distribution)	11,966,400	20,417,670	68,058,900	595,575	8,735,100	10,799,760	12,561,975	29,152,770	78,858,660	120,573,405			
Substation Flooding	-	-	-	8,338,050	794,100	1,588,200	8,338,050	794,100	1,588,200	10,720,350			
Substation Animal Mitigation	2,019,330	-	-	-	39,705	397,050	2,019,330	39,705	397,050	2,456,085			
Targeted Undergrounding	6,424,000	15,313,000	38,104,000	8,628,000	19,524,000	26,550,000	15,052,000	34,837,000	64,654,000	114,543,000			
Distribution Transformer Retrofit	-	-	8,293,000	30,105,000	42,053,000	37,568,000	30,105,000	42,053,000	45,861,000	118,019,000			
Long Dur Interruption/High Impact Sites	2,354,000	5,725,000	3,245,000	6,881,000	4,978,000	3,912,000	9,235,000	10,703,000	7,157,000	27,095,000			
Transmission Transformer Bank Replace	6,193,000	18,174,000	9,274,000	25,019,000	38,514,000	19,217,000	31,212,000	56,688,000	28,491,000	116,391,000			
Oil Breaker Replacements	28,244,000	53,998,000	33,415,000	19,654,000	20,051,000	44,925,000	47,898,000	74,049,000	78,340,000	200,287,000			
Enterprise Communications Total	26,989,547	35,877,788	40,895,277	25,807,426	32,282,118	49,964,962	52,796,973	68,159,906	90,860,239	211,817,118			
Next Gen Cellular	1,765,025	2,918,856	1,430,751	2,617,183	2,617,183	255,978	4,382,208	5,536,039	1,686,729	11,604,976			
Mission Critical Voice	227,406	-	10,084,885	146,103	12,948,245	29,061,474	373,509	12,948,245	39,146,359	52,468,113			
POC	394,315	0	0	256,149	0	0	650,464	-	-	650,464			
Biz WAN	0	149,505	149,505	0	158,741	158,741	-	308,246	308,246	616,492			
Grid WAN	4,214,704	1,208,846	747,900	5,198,889	2,617,544	79,410	9,413,593	3,826,390	827,310	14,067,293			
Mission Critical Data Transport	16,784,625	24,107,526	23,408,744	13,322,647	11,355,628	18,129,300	30,107,272	35,463,154	41,538,044	107,108,470			
Towers Shelters Pow Sup	2,450,868	6,961,068	4,815,343	3,515,481	2,317,612	2,110,765	5,966,349	9,278,680	6,926,108	22,171,137			
Network Asset Systems	312,240	407,387	258,149	202,832	267,165	169,294	515,072	674,552	427,443	1,617,067			
Vehical Area Network	840,364	124,600	-	548,142	-	-	1,388,506	124,600	-	1,513,106			
Distribution Automation	36,142,000	17,863,000	61,382,000	16,322,000	32,881,000	29,696,000	52,464,000	50,744,000	91,078,000	194,286,000			
Transmission System Intelligence	24,008,000	30,290,000	8,414,000	6,829,000	11,311,000	5,559,000	30,837,000	41,601,000	13,973,000	86,411,000			
Enterprise Applications	4,348,000	3,140,000	9,555,000	1,361,000	3,211,000	6,232,000	5,709,000	6,351,000	15,787,000	27,847,000			
Integrated Systems Operations Planning	3,028,000	379,000	749,000	1,830,000	233,000	431,000	4,858,000	612,000	1,180,000	6,650,000			
DER Dispatch Tool	1,738,000	2,032,000	762,000	1,118,000	1,307,000	490,000	2,856,000	3,339,000	1,252,000	7,447,000			
Power Electronics for Volt/VAR Control	-	347,000	347,000	36,000	532,000	532,000	36,000	879,000	879,000	1,794,000			
Physical and Cyber Security Total	51,911,338	10,872,866	2,301,782	13,683,052	23,964,765	31,024,239	65,594,390	34,837,631	33,326,021	133,758,042			
Substation Phys Security	47,117,700	7,254,630	-	7,742,475	20,170,140	28,428,780	54,860,175	27,424,770	28,428,780	110,713,725			
Windows Based Unit Change outs	822,690	-	-	-	-	-	822,690	-	-	822,690			
Device Entry Alert System	1,197,327	745,237	0	770,410	479,416	0	1,967,737	1,224,653	-	3,192,390			
Secure Access Device Mgmt	1,728,621	1,512,999	1,021,782	1,112,267	973,527	657,464	2,840,888	2,486,526	1,679,246	7,006,660			
Line Device Protection**	1,045,000	1,360,000	1,280,000	4,057,900	2,341,682	1,937,995	5,102,900	3,701,682	3,217,995	12,022,577			
Mission Critical Voice & Data Total	17,012,031	24,107,526	33,493,629	13,468,750	24,303,873	47,190,774	30,480,781	48,411,399	80,684,403	159,576,583			
Enterprise Comm's Total w/o	309,754,584	430,365,798	516,654,330	214,266,353	307,163,915	381,447,437	524,020,937	737,529,713	898,101,767	2,159,652,417			

	DEC			DEP			TOTAL			
	2020	2021	2022	2020	2021	2022	2020	2021	2022	GIP TOTAL
TOTALS	51,911,338	10,872,866	2,301,782	13,683,052	23,964,765	31,024,239	65,594,390	34,837,631	33,326,021	133,758,042
Substation Phys Security	47,117,700	7,254,630	-	7,742,475	20,170,140	28,428,780	54,860,175	27,424,770	28,428,780	110,713,725
Windows Based Unit Change outs	822,690	-	-	-	-	-	822,690	-	-	822,690
Device Entry Alert System	1,197,327	745,237	0	770,410	479,416	0	1,967,737	1,224,653	-	3,192,390
Secure Access Device Mgmt	1,728,621	1,512,999	1,021,782	1,112,267	973,527	657,464	2,840,888	2,486,526	1,679,246	7,006,660
Line Device Protection**	1,045,000	1,360,000	1,280,000	4,057,900	2,341,682	1,937,995	5,102,900	3,701,682	3,217,995	12,022,577

	DEC			DEP			TOTAL			
	2020	2021	2022	2020	2021	2022	2020	2021	2022	GIP TOTAL
TOTALS	26,989,547	35,877,788	40,895,277	25,807,426	32,282,118	49,964,962	52,796,973	68,159,906	90,860,239	211,817,118
Next Gen Cellular	1,765,025	2,918,856	1,430,751	2,617,183	2,617,183	255,978	4,382,208	5,536,039	1,686,729	11,604,976
Mission Critical Voice	227,406	-	10,084,885	146,103	12,948,245	29,061,474	373,509	12,948,245	39,146,359	52,468,113
POC	394,315	0	0	256,149	0	0	650,464	-	-	650,464
Biz WAN	0	149,505	149,505	0	158,741	158,741	-	308,246	308,246	616,492
Grid WAN	4,214,704	1,208,846	747,900	5,198,889	2,617,544	79,410	9,413,593	3,826,390	827,310	14,067,293
Mission Critical Data Transport	16,784,625	24,107,526	23,408,744	13,322,647	11,355,628	18,129,300	30,107,272	35,463,154	41,538,044	107,108,470
Towers Shelters Pow Sup	2,450,868	6,961,068	4,815,343	3,515,481	2,317,612	2,110,765	5,966,349	9,278,680	6,926,108	22,171,137
Network Asset Systems	312,240	407,387	258,149	202,832	267,165	169,294	515,072	674,552	427,443	1,617,067
Vehical Area Network	840,364	124,600	-	548,142	-	-	1,388,506	124,600	-	1,513,106
Mission Critical Voice & Data Total	17,012,031	24,107,526	33,493,629	13,468,750	24,303,873	47,190,774	30,480,781	48,411,399	80,684,403	159,576,583
Enterprise Comm's Total w/o	9,977,516	11,770,262	7,401,648	12,338,676	7,978,245	2,774,188	22,316,192	19,748,507	10,175,836	52,240,535

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 8**

Docket No. E-7, Sub 1214

Date of Request: January 31, 2020

Date of Response: February 10, 2020

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The attached response to NCJC Data Request No. 8-27, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning and Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

8-27. Refer to DEC's response to NCJC DR 5-53, which states "In the last 5 years, Conductor failures on the DEC 44kV Transmission system have resulted in 14,008 customer outages, totaling 2,180,102 customer minutes interrupted."

- a. How many individual conductor failures are represented in these statistics?
- b. How many miles of 44kV lines does DEC have?

Response:

- a. Individual conductor assets are not tracked to specific outages in the Transmission Reliability Reporting System, although there were 8 unique events that comprised the above-mentioned customer interruptions and customer minutes interrupted.
- b. Approximately 2,800 miles

**Duke Energy Progress
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-2, Sub 1219

**Date of Request: January 31, 2020
Date of Response: February 10, 2020**

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The attached response to NCJC Data Request No. 5-18, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Progress

Request:

5-18. Refer to DEP's response to NCJC DEP DR 2-17(f), which states "In the last 5 years, Conductor failures on the DEC 44kV Transmission system have resulted in 14,008 customer outages, totaling 2,180,102 customer minutes interrupted."

- a. How many individual instances of 44kV conductor failure are represented in these statistics?
- b. How many miles of 44kV lines does DEP have?

Response:

- a. This question is not applicable to DEP since DEP has no 44kV transmission lines.
- b. 0 miles

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 8**

Docket No. E-7, Sub 1214

Date of Request: January 31, 2020

Date of Response: February 10, 2020

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The attached response to NCJC Data Request No. 8-28, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning and Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

8-28. Refer to DEC's response to NCJC DR 5-54, which states ". . . in the last 5 years, line equipment failures on the DEC 44kV Transmission system have resulted in 111,477 customer outages, totaling 21,179,109 customer minutes interrupted."

- a. How many individual instances of line equipment failures are represented in these statistics?
- b. How many individual pieces of 44kV line equipment does DEC have today?

Response:

- a. 85 unique events are represented in the referenced statistics.
- b. Line equipment assets are not all uniquely tracked and identified as pieces of equipment in the Duke Energy Transmission Asset Management system, therefore a number cannot be provided. Example of line equipment include: Conductor, Static, Crossarms, Poles, Guy Wire, Insulators, Connectors, Clamps, Jumpers, Cross Braces, Switches, Hardware. A 44kV line rebuild project replaces all of these assets on a given line.

**Duke Energy Progress
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-2, Sub 1219

**Date of Request: January 31, 2020
Date of Response: February 10, 2020**

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The attached response to NCJC Data Request No. 5-19, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Progress

Request:

5-19. Refer to DEP's response to NCJC DEP DR 2-18(d), which states "In the last 5 years, DEP Line Equipment failures have resulted in 155,091 customer outages, totaling 10,707,502 customer minutes interrupted."

- a. How many individual instances of 44kV conductor failure are represented in these statistics?
- b. How many miles of 44kV lines does DEP have?

Response:

- a. This question is not applicable to DEP since DEP has no 44kV transmission lines.
- b. 0 miles

With regards to NCJC DEP DR 2-18(d), which states "In the last 5 years, DEP Line Equipment failures have resulted in 155,091 customer outages, totaling 10,707,502 customer minutes interrupted" the following is applicable:

- 14 unique events are represented in the referenced statistics.
- Line equipment assets are not all uniquely tracked and identified as pieces of equipment in the Duke Energy Transmission Asset Management system, therefore a number cannot be provided. Examples of line equipment include: Conductor, Static, Crossarms, Poles, Guy Wire, Insulators, Connectors, Clamps, Jumpers, Cross Braces, Switches, Hardware.

**Duke Energy Carolinas
Response to
North Carolina Sustainable Energy Association Data Request
Data Request No. NCSEA 3**

Docket No. E-7, Sub 1214

Date of Request: December 20, 2019

Date of Response: January 2, 2020

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The attached response to NCSEA Data Request No. 3-11, was provided to me by the following individual(s): Karen Ann Ralph, Senior Financial Analyst, Distribution Finance – Carolinas, and was provided to NCSEA under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

Refer to Duke's response to NCSEA DR2-38, which defines multiplier for cleared operations as "This is the relationship between sustained operations and momentary operations such that for every 1 sustained interruption we would expect to have 2.7 momentary interruptions. It is used to estimate the Annual Momentary Events in the calculation of the customer Momentary Interruption Cost Avoided values."

- a. Provide all data sources, work sheets and calculations, including all relay settings, coordination curves, work processes, policies, and other information used to justify 2.7 momentaries per sustained outage.
- b. Use an example to explain how 2.7 momentaries would typically result from one sustained outage.

Response:

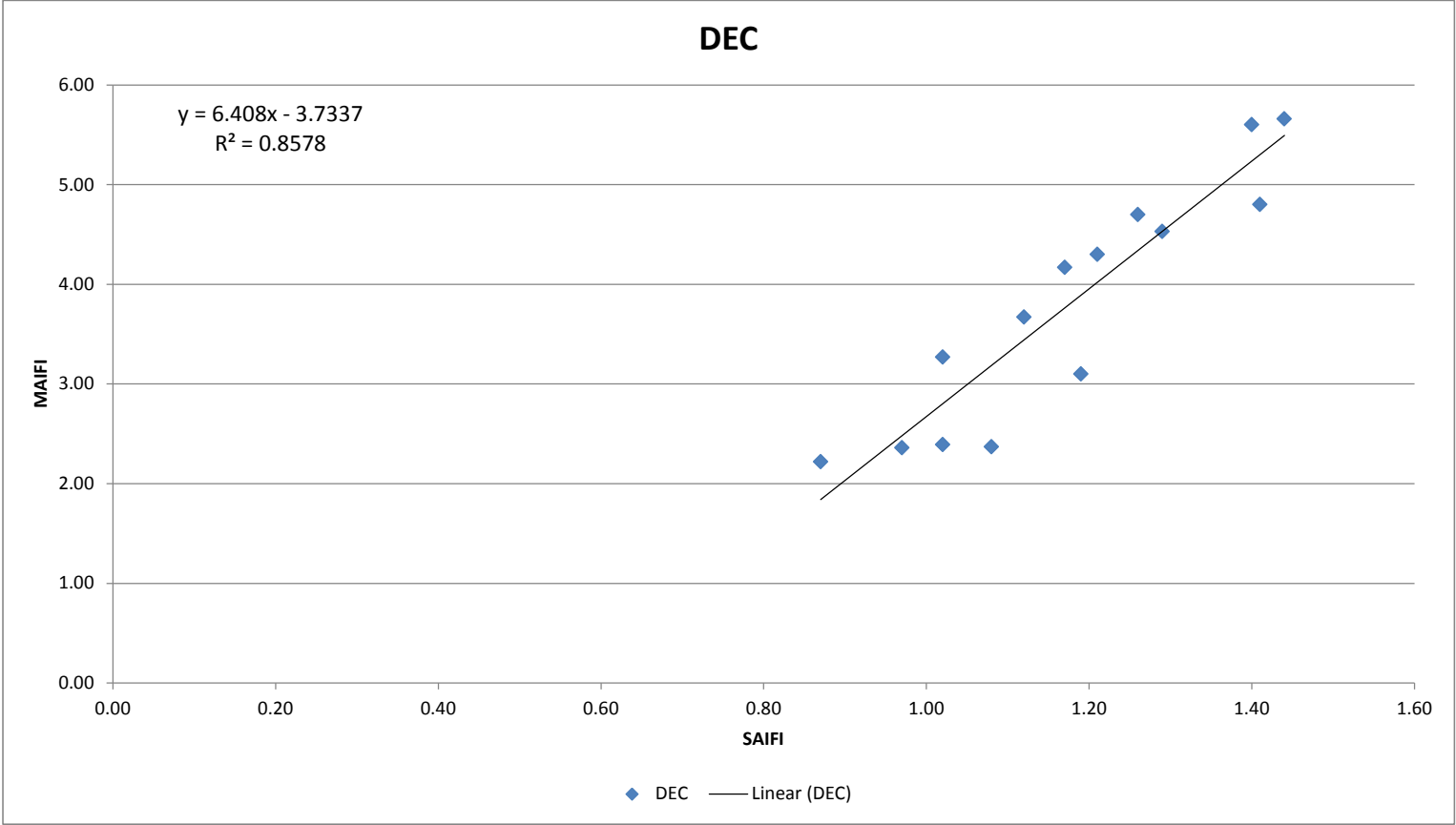
- a. See attached file "1997-2010 DEC SAIFI and MAIFI.xlsx"
- b. The attached file shows the very strong correlation between SAIFI & MAIFI with a R2 of 86%. If SAIFI is set equal to 1 in the trendline formula the MAIFI equals approximately 2.7 which means that for every 1 sustained interruption the average customer experiences they will experience 2.7 momentary interruptions.



NCSEA 3-11
1997-2010 DEC SAIFI

Based on DEC data from 1997 through 2010 (13 years) for every 1 sustained interruption the average customer experiences they will experience 2.7 momentary interruptions

DEC	SAIFI	MAIFI _(Breaker)
1997	1.40	5.60
1998	1.44	5.66
1999	1.41	4.80
2000	1.29	4.53
2001	1.17	4.17
2002	1.21	4.30
2003	1.26	4.70
2004	1.02	3.27
2005	1.12	3.67
2006	1.19	3.10
2007	0.97	2.36
2008	1.08	2.37
2009	0.87	2.22
2010	1.02	2.39



**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-7, Sub 1214

Date of Request: January 16, 2020

Date of Response: January 27, 2020

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The attached response to NCJC Data Request No. 5-32, was provided to me by the following individual(s): Karen Ann Ralph, Senior Financial Analyst, Distribution Finance – Carolinas, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

5-32. Refer to DEC's response to NCSEA DR 3-26 (b), which states: "Duke does not currently track, record, or report momentary outages. For estimation of momentary interruptions refer to the responses for NCSEA 3-11." Refer also to NCSEA DR 3-11, which indicates that momentaries per sustained outage are calculated using a MAIFI (momentary) per SAIFI ratio.

- a. Explain how DEC derived the MAIFI values employed in the response to NCSEA DR 3-11 if it does not track momentary outages.
- b. Provide MAIFI(Breaker) and SAIFI data for each year from 2011 to 2018 for DEC. If this data is not available, explain why DEC stopped tracking MAIFI data after 2010.

Response:

- a. As indicated in the Excel spreadsheet supporting the company's response to NCSEA DR 3-11 (titled NCSEA 3-11 1997-2010 DEC SAIFI and MAIFI) the MAIFI is the substation breakers in DEC where momentary operations were recorded & stored from 1997 – 2010.
- b. MAIFIBreaker is not available after 2010. The company stopped the manual process of capturing & storing MAIFIBreaker after 2010 because the program used to store the data became obsolete.

**Duke Energy Carolinas
Response to
NCJC Data Request
Data Request No. 5**

Docket No. E-7, Sub 1214

Date of Request: January 16, 2020

Date of Response: January 27, 2020

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The attached response to NCJC Data Request No. 5-10, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

5-10. Refer to the Oliver testimony regarding the Grid Improvement Plan generally. Assume that all aspects of Duke's Grid Improvement Plan are approved. Provide the improvement over 2018 DEC SAIDI, with and without major event days, Duke expects the Plan will deliver, as well as the year by which Duke expects the improvements to be reflected.

Response:

See attached Excel spreadsheet titled "PS DR 36-5 DEC GIP SAIFI-SAIDI Savings By Year 2019 - 2025 (Revised 11-19-19)". The Company has not done any GIP SAIDI reduction analysis associated with MEDs because their frequency and impact are highly variable from year-to-year.



PS DR 36-5 DEC GIP
SAIFI-SAIDI Savings B

Duke Energy Carolinas, LLC
Docket No. E-7, Sub 1214
Public Staff Data Request No. 36-5 (Revised 11-19-19)

DEC 2019 - 2024 Scope	Estimated Incremental SAIDI Minutes Reduction in 2019	Estimated Incremental SAIDI Minutes Reduction in 2020	Estimated Incremental SAIDI Minutes Reduction in 2021	Estimated Incremental SAIDI Minutes Reduction in 2022	Estimated Incremental SAIDI Minutes Reduction in 2023	Estimated Incremental SAIDI Minutes Reduction in 2024	Estimated Incremental SAIDI Minutes Reduction in 2025
Total	2.07	1.75	4.78	8.75	10.52	N/A*	N/A*
SOG	2.07	0.99	3.38	6.65	6.81		
TUG	0.00	0.05	0.22	0.33	0.55		
Transformer Retrofit	0.00	0.09	0.00	0.00	0.00		
LDO/ HIS	0.00	0.55	0.75	1.01	1.15		
Hydraulic Recloser Replacement	0.00	0.07	0.21	0.00	0.10		
Fuse Replacement	0.00	0.00	0.23	0.75	1.90		
Projected # of Customers Served	2,598,518	2,631,647	2,665,198	2,699,177	2,733,589		

DEC 2019 - 2024 Scope	Estimated Incremental SAIFI Reduction in 2019	Estimated Incremental SAIFI Reduction in 2020	Estimated Incremental SAIFI Reduction in 2021	Estimated Incremental SAIFI Reduction in 2022	Estimated Incremental SAIFI Reduction in 2023	Estimated Incremental SAIFI Reduction in 2024	Estimated Incremental SAIFI Reduction in 2025
Total	0.0166	0.0091	0.0224	0.0460	0.0660	N/A*	N/A*
SOG	0.0166	0.0077	0.0178	0.0379	0.0472		
TUG	0.0000	0.0002	0.0010	0.0015	0.0024		
Transformer Retrofit	0.0000	0.0005	0.0000	0.0000	0.0000		
LDO/ HIS	0.0000	0.0003	0.0006	0.0009	0.0012		
Hydraulic Recloser Replacement	0.0000	0.0004	0.0013	0.0000	0.0006		
Fuse Replacement	0.0000	0.0000	0.0017	0.0057	0.0145		
Projected # of Customers Served	2,598,518	2,631,647	2,665,198	2,699,177	2,733,589		

* The current GIP scope ends in 2022 so there are no estimated incremental SAIDI/SAIFI savings beyond 2023

NOTE: We have not included the effect of transmission programs in these estimates, although transmission Grid Improvement programs will certainly improve system reliability. These programs are not quantified because transmission failures occur on a much more infrequent basis and therefore we cannot accurately predict short term impacts on SAIDI and SAIFI. However, when transmission outages do occur they typically affect a large number of customers.

**Duke Energy Progress
Response to
NCJC Data Request
Data Request No. 2**

Docket No. E-2, Sub 1219

**Date of Request: January 16, 2020
Date of Response: January 24, 2020**

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The attached response to NCJC Data Request No. 2-7, was provided to me by the following individual(s): Karen Ann Ralph, Lead Planning & Regulatory Support Specialist, and was provided to NCJC under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Progress

Request:

2-7. Refer to the Oliver testimony regarding the Grid Improvement Plan generally. Assume that all aspects of Duke's Grid Improvement Plan are approved. Provide the improvement over 2018 DEP SAIDI, with and without major event days, Duke expects the Plan will deliver, as well as the year by which Duke expects the improvements to be reflected.

Response:

See attached Excel spreadsheet titled "PS DR 21-11 for the DEP GIP SAIFI-SAIDI Savings By Year 2019 – 2025". The Company has not done any GIP SAIDI reduction analysis associated with MEDs because their frequency and impact are highly variable from year-to-year.



PS DR 21-11 DEP
GIP SAIFI-SAIDI Savir

DEP 2019 - 2023 Scope	Estimated Incremental SAIDI Minutes Reduction in 2019	Estimated Incremental SAIDI Minutes Reduction in 2020	Estimated Incremental SAIDI Minutes Reduction in 2021	Estimated Incremental SAIDI Minutes Reduction in 2022	Estimated Incremental SAIDI Minutes Reduction in 2023	Estimated Incremental SAIDI Minutes Reduction in 2024	Estimated Incremental SAIDI Minutes Reduction in 2025
Total	13.00	2.88	10.69	12.02	12.99	N/A*	N/A*
SOG	13.00	2.28	7.91	7.25	8.00		
TUG	0.00	0.00	0.04	0.15	0.27		
Transformer Retrofit	0.00	0.37	0.52	0.73	0.72		
LDO/ HIS	0.00	0.08	1.68	2.22	2.56		
Hydraulic Recloser Replacement	0.00	0.12	0.20	0.11	0.06		
Fuse Replacement	0.00	0.03	0.34	1.57	1.39		
Projected # of Customers Served	1,572,852	1,594,854	1,617,163	1,639,785	1,662,723		

DEP 2019 - 2023 Scope	Estimated Incremental SAIFI Reduction in 2019	Estimated Incremental SAIFI Reduction in 2020	Estimated Incremental SAIFI Reduction in 2021	Estimated Incremental SAIFI Reduction in 2022	Estimated Incremental SAIFI Reduction in 2023	Estimated Incremental SAIFI Reduction in 2024	Estimated Incremental SAIFI Reduction in 2025
Total	0.0823	0.0190	0.0694	0.1032	0.0880	N/A*	N/A*
SOG	0.0823	0.0141	0.0457	0.0652	0.0495		
TUG	0.0000	0.0000	0.0005	0.0014	0.0022		
Transformer Retrofit	0.0000	0.0037	0.0052	0.0073	0.0072		
LDO/ HIS	0.0000	0.0002	0.0141	0.0167	0.0181		
Hydraulic Recloser Replacement	0.0000	0.0008	0.0013	0.0007	0.0004		
Fuse Replacement	0.0000	0.0002	0.0026	0.0119	0.0106		
Projected # of Customers Served	1,572,852	1,594,854	1,617,163	1,639,785	1,662,723		

* The current GIP scope ends in 2022 so there are no estimated **incremental** SAIDI/SAIFI savings beyond 2023

NOTE: We have not included the effect of transmission programs in these estimates, although transmission Grid Improvement programs will certainly improve system reliability. These programs are not quantified because transmission failures occur on a much more infrequent basis and therefore we cannot accurately predict short term impacts on SAIDI and SAIFI. However, when transmission outages do occur they typically affect a large number of customers.

**Duke Energy Carolinas
Response to
North Carolina Sustainable Energy Association Data Request
Data Request No. NCSEA 2**

Docket No. E-7, Sub 1214

Date of Request: November 18, 2019

Date of Response: November 25, 2019

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The attached response to NCSEA Data Request No. 2-16, was provided to me by the following individual(s): Karen Ann Ralph, Senior Financial Analyst, Distribution Finance - Carolinas, and was provided to NCSEA under my supervision.

Camal O. Robinson
Senior Counsel
Duke Energy Carolinas

Request:

16. Refer to the Oliver testimony regarding stakeholder engagement generally, pages 45-50.
- a. Indicate where in any stakeholder engagement presentation or materials Duke Energy presented the likely rate impact of its \$2.5 billion Grid Improvement Plan.
 - b. Indicate where in any stakeholder engagement presentation or materials Duke Energy presented the impact on the average residential customer's bill of its \$2.5 billion Grid Improvement Plan.
 - c. Describe any input Duke Energy received from Stakeholders regarding the overall size of the Grid Improvement Plan, which Duke Energy estimated at \$1.6-\$2.5 billion over 3 years in stakeholder engagement presentations and materials.
 - d. Describe any changes Duke Energy made to the overall size of the Grid Improvement Plan, which Duke Energy estimated at \$1.6-\$2.5 billion over 3 years in stakeholder engagement presentations and materials, as a result of stakeholder feedback.

Response:

- a. None.
- b. None.
- c. Please see Witness Oliver's direct testimony, Exhibits 11, 13, 16, and 17
- d. No changes were made to that estimated range.