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December 15, 2017

VIA ELECTRONIC FILING

M. Lynn Jarvis, Chief Clerk
North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, North Carolina 27699-4300

RE: Duke Energy Carolinas, LLC's Verified Response to November 20, 2017 Order Requiring Additional Information
Docket Nos. E-7, Sub 1115 and E-100, Sub 147

Dear Ms. Jarvis:

I enclose Duke Energy Carolinas, LLC's Verified Response to the Commission's August 21, 2017 *Order Requiring Additional Information* for filing in connection with the referenced matter.

Certain information contained in the Response to Question No. 4 is confidential, and DEC requests that this information be treated confidentially pursuant to N.C. Gen. Stat. §132-1.2. The redacted information contains incremental pricing for direct connect meters. Disclosure of this proprietary, trade secret cost information would harm the Company if disclosed publicly to competitors in the market because of its commercial value and sensitivity. Parties to the docket may contact the Company to obtain copies pursuant to an appropriate confidentiality agreement.

Thank you for your attention to this matter. If you have any questions, please let me know.

Sincerely,

Lawrence B. Somers

Enclosures

cc: Parties of Record

Duke Energy Carolinas, LLC's Verified Response to
November 20, 2017 Order Requiring Additional Information
Docket Nos. E-7, Sub 1115 and E-100, Sub 147
December 15, 2017

DEC NC Opt-out – NCUC Questions – Due December 15, 2017

1. **Please confirm whether there are any radio frequency (RF) emissions from a cellular direct connect meter. If there are, how do those emissions compare in terms of intensity and duration to the emissions from the AMI meters that DEC is installing? How do they compare to the emissions from the AMR meters that DEC is retiring?**

   Response:

   The AMI Open Way mesh meters communicate using the 900Mhz frequency and the Direct Connect meters communicate via a 4G cellular modem. Since the Direct Connect meters are "point to point," the total amount of time the direct connect meter is communicating is less than 1.5 minutes per day for daily reads. The mesh meter communicates on average 3 minutes per day as there is additional communication traffic that occurs in a mesh network to ensure the meter is connected to the mesh. The table below shows radio output based on FCC limits.

Transmitter	Power Density (mW/cm2 at 20 cm)	FCC MPE Limit (mW/cm2 at 20 cm)	Margin from FCC Limit
AMR Meter (low power)	0.000008	0.61	0.003%
AMR Meter (high power)	0.000052	0.61	0.086%
AMI Mesh Meter (Min)	0.00005	0.61	0.08%
AMI Mesh Meter (Max)	0.0182	0.61	2.98%
Cellular Meter (@1905MHz)	0.0077	1.0	1.67%
**At 0.2 meter distance			

2. **How many cellular direct connect meters has DEC installed in North Carolina to date? How many does DEC estimate will have been installed when DEC's North Carolina AMI deployment is completed?**

   Response:

   24,618 4G Direct Connect meters have been installed in DEC North Carolina as of December 8, 2017. An additional 20,753 4G Direct Connect meters are planned to be installed in DEC North Carolina. When deployment is complete, there will be an estimated total of 45,371 4G Direct Connect Meters in DEC North Carolina.

3. **Was the cost of that estimated number of cellular direct connect meters factored into the Company's cost/benefit analysis?**

Response:

Yes, the Company factored both initial and ongoing costs for cellular direct connect meters into its analysis.

4. **What is the cost of a cellular direct connect installation? How does that compare to the cost of an AMI meter? An AMI meter with its communications disabled?**

Response:

The process to physically install a cellular direct connect meter, a standard AMI meter and an AMI meter with communications disabled is the same. Therefore, there would be no cost difference for installation. As noted in question 3, the Company factored in both the initial and ongoing costs for the cellular direct connect meters into its analysis. The additional cost of a cellular direct connect meter over a standard AMI mesh meter ranges from **[BEGIN CONFIDENTIAL]** [redacted] **[END CONFIDENTIAL]** based on the need for a single phase or polyphase meter type.

5. **How does DEC propose to recover the costs of the cellular direct connect meters? Will DEC propose that the rural customers whose locations require this technology be charged for the incremental cost over and above the cost of an AMI meter?**

Response:

DEC does not plan to seek recovery of AMI cellular direct connect meters differently from the larger AMI program costs. Some costs for the DEC AMI program are included in the pending DEC NC rate case (Docket No. E-7, Sub 1146). As noted in the response to question 3 the Company planned for use of cellular direct connect meters in the AMI analysis. The cellular direct connect meters will be used in situations where it's not economical to install range extenders to extend the RF mesh to reach a customer. DEC is not proposing separate fees to charge customers serviced by a cellular direct connect meter due to the RF mesh not being available at a customer location.

6. **Please describe and discuss fully an option wherein DEC uses the cellular direct connect meter, with the meter read only once a month, for those customers who want to opt-out of having an AMI meter (instead of offering those customers AMI meters with their communications disabled).**

Response:

Based on Company investigations with the vendor a direct connect meter could be configured to be read once a month, but requires changes to the vendor headend system which would result in a custom solution and coding to the vendor software and to Company systems to identify which customers would be on monthly reads. As an example, the meter headend system does not have information on the customer's billing cycle, as it interrogates all of the meters nightly. The billing and meter data management systems use the meter information to calculate the bill on the applicable billing cycle. This functionality is not present today and would require a significant customization from the vendor to update the headend system. Additionally, changes would be required in the meter data management system and the billing system to ensure billing cycle and specific meter identification information was shared among the three systems.

DEC has not considered a cellular direct connect meter as an option for opt-out customers since a cellular device emits RF much like a cell phone.

As noted by the Public Staff in their comments filed September 28, 2017 at pages 2-3:

> *"Question 3 contemplates meters that would be able to still communicate through the mesh network once a month (or every 30 days). Allowing the communication capabilities to be performed on a limited basis, even once per month, would appear to go counter to the requests of customers who have expressed a desire to not have a meter that communicates at all. As such, the Public Staff believes that the Company's proposal to provide opt-out customers a Non-Communicating meter with its communicating capabilities fully disabled remains the most practical and reasonable means of addressing the issues raised by these customers."*

Based on this premise, the Company does not view this as a suitable option to address customers' concerns of having a smart meter and the associated RF emissions. For this reason, and the additional justification provided through previous verified responses, the Company continues to support the originally filed manually-read meter option which provides a non-communicating AMI meter for customers who choose to have a meter that does not communicate via RF.

7. What would be the advantages and disadvantages of having only one (cellular direct connect meters), rather than two (cellular direct connect meters and disabled AMI meters), non-standard metering configurations?

Response:

As stated previously in response to question 6, the Company does not feel a cellular direct connect meter will be a suitable option to address customers' concerns of having a smart meter and the associated RF emissions. Additionally, the Company assumed the limited use

of cellular direct connect meters to service customers in situations where it's not economical to install range extenders to extend the RF mesh to reach a customer. Assuming system modifications can be made by configuring a cellular direct connect meter to only send usage information once per month, this would still require a special meter configuration to provide opt-out. The Company sees no real advantage to this option; the recommended solution is to use a standard AMI meter with all communication capability disabled.

8. **Using the actual historical kilowatt-hour and lost revenue data for energy theft that DEC has experienced and is discovering in North Carolina, including during its AMI deployment, develop an independent estimate of the percent of additional revenues DEC will collect via that deployment that would otherwise be lost due to theft and other non-technical losses.**

Response:

The Company relied upon an independent industry report (EPRI 1016049: Advanced Metering Infrastructure Technology, Limiting Non-Technical Distribution Losses in the Future) to estimate the total Non-Technical Losses (NTL), as it is a significantly complex and arduous analysis to complete. Generation minus delivery equals total losses. Total losses include known losses (Technical Losses – generation, transmission and distribution) and unknown losses. The unknown losses are a combination of NTL (as described by above mentioned EPRI report) and non-metered rates load (street lighting, etc.). The Company periodically assesses total losses; however, it is not able to precisely isolate NTL from Technical Loss or otherwise measure unknown losses unless all individual cases are identified. It would not be possible to use "the actual historical kilowatt-hour and lost revenue data for energy theft that DEC has experienced," as the Company is only able to measure what has been identified. It is also important to note that past experience of NTL identification is not necessarily instructive for the Company's anticipated Revenue Protection capabilities with full AMI deployment. Analytics capabilities for Revenue Protection with AMI are continuing to develop as more AMI data becomes available. A full deployment of AMI is expected to further enhance revenue loss identification abilities.

To complete the requested analysis for question 8, the Company compiled actual identified NTL and associated revenue capture data across multiple work streams which are detailed below. The revenue loss identified that is specifically attributable to the AMI effort was then scaled based on the remaining AMI meters to deploy. Tamper situations may be identified during the AMI deployment; however, not all result in full revenue capture upon investigation (e.g. customer removed tamper device). Also, there are limitations in identifying revenue loss cases such as slowed or stuck meters, which are not visibly identifiable by field performers, yet are corrected at the time of the new meter installation.

For these reasons, the full expected impact of the AMI meter deployment is likely to be understated in the requested analysis.

The analysis resulted in a total NTL percentage of 1.26%. This figure is based on revenue losses identified in DEC by Analytics, Meter Engineering, AMI Deployment team, and Revenue Services. The following assumptions were used to arrive at 1.26%.

- For consistency and simplification of analysis, the percentage of NTL calculations use DEC 2015 Residential and Commercial revenues as the basis.

- Analytics: Incremental and cumulative revenue capture by the Analytics team from NTL for years 2015-2017 was assessed year over year to estimate the expected total revenue loss identification and capture by Analytics with full AMI deployment. The expected total revenue loss identification was then divided by DEC's 2015 total residential and commercial revenues to estimate NTL as a percent of revenues (~0.92%).

- Meter Engineering: Non-technical losses on transformer-rated meters are identified and tracked by the Meter Engineering group. The group leverages AMI data to identify these losses. To estimate the total non-technical losses for transformer-rated meters, the backbilled amounts for each case identified were divided by the number of months the backbill amount corrected to arrive at a monthly revenue impact. The monthly revenue impact was multiplied by 12 to arrive at the annual revenue impact. Because Meter Engineering relies heavily on AMI data to identify these cases, the annual revenue impact was then divided by the total number of transformer rated AMI meters installed in DEC to arrive at the per meter losses. The per meter loss was then multiplied by the total transformer-rated meters in DEC to estimate the total losses for this category. Total losses were then divided by 2015 revenues to estimate the NTL as a percent of revenues (~0.27%).

- AMI Deployment team: Revenue losses identified in 2017 year-to-date by the AMI Deployment team installation vendors at the time of meter installation were divided by the meters installed during 2017 YTD to arrive at the estimated per meter revenue loss identified via the meter replacement. Per meter loss was then multiplied by the meter population in DEC to estimate the total losses for this category. Total losses were then divided by 2015 revenues to estimate the NTL as a percent of revenues (~0.02%).

- Revenue Services: The billing group identifies cases of revenue loss through billing exceptions. 2017 revenue capture was divided by 2015 DEC revenues to estimate NTL as a percent of revenues (~0.02%).

- Unbilled Revenues: Unbilled revenues for identified revenue loss cases are tracked by Revenue Services and average $2.1M per year from 2015-2017. This is ~0.04% of 2015 revenues.

NTL Analytics (~0.92%) + NTL Meter Engineering (~0.27%) + NTL AMI Deployment team (~0.02%) + NTL Revenue Services (~0.02%) + NTL Unbilled (~0.04%) = Total NTL (~1.26%)

For the requested analysis, see the attached Exhibit 1 - DEC AMI Revenue Capture Benefit_NCUC Q8 Dec 2017.

9. **Provide a revised 20-year AMI cost-benefit analysis that includes: (a) the costs of replacing AMI meters at the end of their 15-year lives, (b) the most recent estimate of the costs of cellular direct connect meters, (c) the cost of replacing other components and software at reasonable intervals, and (d) the non-technical revenue loss estimate (rather than the EPRI 2% estimate) developed pursuant to question 8.**

Response:

When developing cost-benefit analyses, Duke Energy does not include full asset replacement of major technology deployments at the end of the asset's useful life. Likewise, the benefits in the years following the expected asset life are not included in analyses. The Company expects a separate analysis for any follow on deployments or replacements of the assets.

The technology landscape is ever changing, thus a full replacement of AMI technology like-for-like is not expected and any future technology deployment would require a standalone analysis to be evaluated upon its own merits (cost-benefit analysis). In addition, the inclusion of a full meter replacement at the end of the meters' expected 15-year life would warrant an extended analysis to reflect the costs and benefits of the replacement AMI meters for the following 15 years. A 20-year analysis that includes asset replacement in Years 16-18 will thus overstate capital deployment costs and understate the on-going costs and benefits. However, in response to the Commission's questions, the requested analysis modifications were performed.

The creation of a cost estimate for work to be done 15 years in the future requires that several assumptions be made, as there are many unknowns. The assumptions used for this analysis are described below.

The cost estimate to replace the AMI meters at end-of-life (EOL) assumes reduced project support and overhead for Network Design, Data and Mapping Management, Change Management, Business Process Management, Meter Route Analysis, Network Mitigation, Itron Professional Services, Business Case Development, IT Architecture, and Billing. The

estimate also does not include the replacement of Cisco Connected Grid Routers (CGRs), as these devices have a 10-year life and their associated replacement costs are already included in the original business case at year 11.

By adding the costs to replace the AMI meters at EOL, the benefits were extended throughout the 20 year analysis.

Direct Connect meter costs are based on the current Itron meter pricing as noted in response to question 4, and the current/expected total Direct Connect meters needed for the full deployment as noted in response to question 2. Total meter costs were updated pursuant to existing contractual pricing with the vendor.

The original business case included costs to replace meters related to on-going failures, thus not all meters deployed during the initial deployment timeframe will be at their end-of-life. For the purpose of this analysis, the cost estimate assumes that all meters in scope of the original deployment would be replaced regardless of whether the meter has truly reached its end of life, despite the fact that a percentage of the meters would have been replaced post-deployment and would be less than 15 years old.

For the 20-year AMI cost-benefit analysis with the requested modifications, see Exhibit 2 - DEC AMI NPV Costs and Benefits Revised NCUC Q9 Dec 2017.

10. Do DEC's contracts with Itron and all other AMI component and software suppliers obligate those suppliers to disclose to DEC if and when other users experience meter hacking or any data breach related to the AMI meters and infrastructure?

Response:

Duke Energy's contracts with Itron and other AMI component and software suppliers do not specifically mention the disclosure to Duke Energy when other users experience meter hacking or data breaches related to AMI meters and infrastructure. However, for our AMI vendors we do have various processes in place to address such issues if they were to arise. For Itron, discovered vulnerabilities are reported by vendors through a Product Information Letter (PIL). This process is used for material findings, whether discovered internally or reported from customers or third-parties. Further, in 2018 Itron has plans to revamp the Itron Security Center (ISC) as a communication vehicle to customers. This service will be used to share vulnerability assessments, remediation activities, reported vulnerabilities, security advisories, and other security related material. Access to the service will be limited to authorized personnel from Itron customers. With all our AMI-related vendors, Duke Energy is a member of utility user groups and attends user conferences annually where utilities have the opportunity to collaborate on new product functionality and issues encountered. In

addition, Duke Energy has regular contact with several other utilities utilizing the same AMI vendors as Duke Energy.

11. Did DEC consider using power line carrier (PLC) technology, instead of radio or cellular, for its AMI deployment? If not, why not? If it was considered, why was it not pursued?

Response:

Yes, the Company considered PLC based technology, but the Company has followed the majority of the industry in adopting radio frequency (RF) mesh AMI communications systems. RF continues to be the most cost-effective solution for large scale AMI communications deployments. The power line carrier (PLC) technology can require a much higher number of communication nodes than RF, at every transformer in the worst case, and therefore becomes cost prohibitive. Certain PLC technologies (e.g., Two-Way Automatic Communication System (TWACS)) have very limited bandwidth due to how the signal travels. The amount of data that can be sent in each communication cycle is limited, and much lower than an RF system. Additionally, when performing switching on the distribution network (rerouting of power for outage restoration or self-healing capabilities), PLC solutions become unreliable. Connectivity to the meters can be lost for hours or even days. Data from the meters can be lost during this period, and even when connectivity is restored, recovery of the data becomes difficult due to the limited bandwidth.

Duke Energy Carolinas

Analysis of Revenue Capture Benefits of AMI Utilizing an Internal Analysis Requested by NCUC in DOCKET NO. E-7, SUB 1115, Question #8

Year	2015 Revenues Residential & Commercal (1)	Revenue Leakage Percentage (2)	AMI Recovery Gain (3)	Collection Percentage (4)	Gross Increased Revenue Capture	Applicable Meters (5)	Phase-In/Out Percent (6)	Net Increased Revenue Capture	Percent of Revenues Collected
1	5,266,872,049	1.26%	80.0%	60.0%	31,854,042	76%	0.0%	$ -	0.0%
2	5,293,206,409	1.26%	80.0%	60.0%	32,013,312	76%	23.8%	$ 5,761,263	0.1%
3	5,319,672,441	1.26%	80.0%	60.0%	32,173,379	76%	55.5%	$ 13,502,053	0.3%
4	5,346,270,803	1.26%	80.0%	60.0%	32,334,246	76%	87.3%	$ 21,344,557	0.4%
5	5,373,002,157	1.26%	80.0%	60.0%	32,495,917	76%	100.0%	$ 24,571,913	0.5%
6	5,399,867,168	1.26%	80.0%	60.0%	32,658,397	76%	100.0%	$ 24,694,772	0.5%
7	5,426,866,504	1.26%	80.0%	60.0%	32,821,689	76%	100.0%	$ 24,818,246	0.5%
8	5,454,000,837	1.26%	80.0%	60.0%	32,985,797	76%	100.0%	$ 24,942,337	0.5%
9	5,481,270,841	1.26%	80.0%	60.0%	33,150,726	76%	100.0%	$ 25,067,049	0.5%
10	5,508,677,195	1.26%	80.0%	60.0%	33,316,480	76%	100.0%	$ 25,192,384	0.5%
11	5,536,220,581	1.26%	80.0%	60.0%	33,483,062	76%	100.0%	$ 25,318,346	0.5%
12	5,563,901,684	1.26%	80.0%	60.0%	33,650,477	76%	100.0%	$ 25,444,938	0.5%
13	5,591,721,192	1.26%	80.0%	60.0%	33,818,730	76%	100.0%	$ 25,572,163	0.5%
14	5,619,679,798	1.26%	80.0%	60.0%	33,987,823	76%	100.0%	$ 25,700,023	0.5%
15	5,647,778,197	1.26%	80.0%	60.0%	34,157,763	76%	100.0%	$ 25,828,524	0.5%
16	5,676,017,088	1.26%	80.0%	60.0%	34,328,551	76%	100.0%	$ 25,957,666	0.5%
17	5,704,397,173	1.26%	80.0%	60.0%	34,500,194	76%	100.0%	$ 26,087,454	0.5%
18	5,732,919,159	1.26%	80.0%	60.0%	34,672,695	76%	100.0%	$ 26,217,892	0.5%
19	5,761,583,755	1.26%	80.0%	60.0%	34,846,059	76%	100.0%	$ 26,348,981	0.5%
20	5,790,391,674	1.26%	80.0%	60.0%	35,020,289	76%	100.0%	$ 26,480,726	0.5%
20 Year Total					$ 668,269,627			$ 448,851,289	

Annual load growth percent = 0.50%
Discount Rate 7.00%

NPV	$214,929,100

NOTES:

(1) 2015 DEC Residential/Commercial revenue
(2) Amount of revenue subject to erosion from non-technical losses based on requested analysis
(3) Amount of revenue erosion identifiable through use of AMI
(4) Amount to be collected from identified revenue erosion
(5) Applicable meters = Meters yet to convert (1,966,000) / Total meters (2,600,000)
(6) Alignment of benefits to proposed installation schedule

Duke Energy Carolinas Advanced Metering Infrastructure Cost Benefit Analysis

Revised Dec. 2017 for Question #9 of NCUC Data Request

		AMI Program Costs ($000s)									AMI Program Benefits ($000s)											Net Present Value		
		Total Capital Program Costs	Total Capital Recurring Costs	Total O&M Program Costs	Total O&M Recurring costs	*Capital Recurring - Deployment*	*O&M Recurring - Deployment*	*Capital Recurring - IT Hardware*	*Capital Recurring - Software*	*O&M Recurring - Software*	Reduced meter reading costs	Reduced meter operations costs - consumer order workers for meter orders	Reduced meter operations costs - field metering labor	Reduced meter operations costs - testing, repairs, reading equipment	Reduced restoration costs - OK on arrival	Reduced restoration costs - major storms	Misc O&M savings	Reduced equipment failures	Misc capital savings	AMR/AMI meter salvage value	Non-technical line loss reduction - power theft, equipment failures and installation errors	**Net Benefits and (Costs)**	Loss on Net Book Value of AMR Meters	Net Benefits & (Costs)
1	2016	- 42,344	-	- 350	- 253	-	*- 253*	-	-	-	492	-	1,333	-	-	-	-	-	-	257	-	**- 40,866**	- 85,050	- 125,916
2	2017	- 142,756	- 443	- 2,750	- 1,364	*- 443*	*- 1,364*	-	-	-	792	2,004	3,232	-	122	291	436	571	145	580	5,761	**- 133,379**	-	- 133,379
3	2018	- 145,679	- 796	- 3,250	- 2,588	*- 796*	*- 2,588*	-	-	-	1,440	4,815	3,242	-	293	698	1,047	1,371	349	533	13,502	**- 125,024**	-	- 125,024
4	2019	- 33,382	- 886	-	- 2,873	*- 886*	*- 2,873*	-	-	-	2,250	7,800	3,242	-	475	1,130	1,696	2,221	565	1	21,345	**3,583**	-	3,583
5	2020	-	- 1,839	-	- 4,062	*- 1,839*	*- 4,062*	-	-	-	2,470	8,034	-	-	489	1,164	1,747	2,288	582	-	24,572	**35,445**	-	35,445
6	2021	-	- 2,157	-	- 4,273	*- 1,840*	*- 4,170*	*- 317*	-	*- 103*	2,542	9,479	-	-	577	1,374	2,061	2,700	687	-	24,695	**37,684**	-	37,684
7	2022	-	- 6,098	-	- 4,383	*- 2,100*	*- 4,280*	*- 3,880*	*- 119*	*- 103*	2,617	9,764	-	-	594	1,415	2,123	2,781	708	-	24,818	**34,337**	-	34,337
8	2023	-	- 2,742	-	- 4,551	*- 2,101*	*- 4,392*	*- 523*	*- 119*	*- 158*	2,694	10,056	-	-	612	1,457	2,186	2,864	729	-	24,942	**38,249**	-	38,249
9	2024	-	- 2,292	-	- 4,506	*- 2,102*	*- 4,506*	*- 190*	-	-	2,773	10,358	-	-	630	1,501	2,252	2,950	751	-	25,067	**39,485**	-	39,485
10	2025	-	- 2,103	-	- 4,700	*- 2,103*	*- 4,621*	-	-	*- 79*	2,855	10,669	-	-	649	1,546	2,319	3,038	773	-	25,192	**40,240**	-	40,240
11	2026	-	- 15,523	-	- 4,817	*- 15,159*	*- 4,738*	*- 285*	*- 79*	*- 79*	2,939	10,989	-	-	669	1,593	2,389	3,130	796	-	25,318	**27,482**	-	27,482
12	2027	-	- 5,456	-	- 5,015	*- 1,846*	*- 4,857*	*- 3,492*	*- 119*	*- 158*	3,026	11,319	-	-	689	1,640	2,461	3,223	820	-	25,445	**38,152**	-	38,152
13	2028	-	- 2,356	-	- 4,978	*- 1,846*	*- 4,978*	*- 470*	*- 40*	-	3,115	11,658	-	-	710	1,690	2,534	3,320	845	-	25,572	**42,110**	-	42,110
14	2029	-	- 2,018	-	- 5,180	*- 1,847*	*- 5,100*	*- 171*	-	*- 79*	3,207	12,008	-	-	731	1,740	2,610	3,420	870	-	25,700	**43,089**	-	43,089
15	2030	-	- 1,927	-	- 5,304	*- 1,848*	*- 5,225*	-	*- 79*	*- 79*	3,302	12,368	-	-	753	1,792	2,689	3,522	896	-	25,829	**43,919**	-	43,919
16	2031	- 37,193	- 2,185	-	- 5,510	*- 1,849*	*- 5,352*	*- 257*	*- 79*	*- 158*	3,399	12,739	2,077	-	775	1,846	2,769	3,628	923	400	25,958	**9,627**	-	9,627
17	2032	- 113,332	- 5,032	-	- 5,481	*- 1,850*	*- 5,481*	*- 3,142*	*- 40*	-	3,499	13,121	5,186	-	799	1,902	2,852	3,737	951	930	26,087	**- 64,780**	-	- 64,780
18	2033	- 114,224	- 2,314	-	- 5,691	*- 1,851*	*- 5,612*	*- 423*	*- 40*	*- 79*	3,604	13,515	5,359	-	823	1,959	2,938	3,849	979	881	26,218	**- 62,104**	-	- 62,104
19	2034	- 23,584	- 2,085	-	- 5,825	*- 1,852*	*- 5,746*	*- 154*	*- 79*	*- 79*	3,713	13,921	5,520	-	847	2,017	3,026	3,964	1,009	1	26,349	**28,874**	-	28,874
20	2035	-	- 1,932	-	- 6,040	*- 1,853*	*- 5,882*	-	*- 79*	*- 158*	3,824	14,338	-	-	873	2,078	3,117	4,083	1,039	-	26,481	**47,861**	-	47,861
		- 652,494	- 60,185	- 6,350	- 87,394	*- 46,011*	*- 86,079*	*- 13,303*	*- 871*	*- 1,314*	54,552	198,957	29,191	-	12,110	28,834	43,251	56,662	14,417	3,582	448,851	**83,985**	**- 85,050**	**- 1,065**

Net Present Value of Benefits & Costs	**- 49,971**	**- 129,660**
Duke Energy Carolinas Weighted Average Cost of Capital	6.7%	
Internal Rate of Return	3.5%	0.0%

Early Retirement of AMR Meters	
Net Book Value of AMR Meters	- 135,000
Loss on Early Retirement of AMR Meters	- 85,050

CERTIFICATE OF SERVICE

I certify that a copy of Duke Energy Carolinas, LLC's Verified Response to November 20, 2017 Order Requiring Additional Information in Docket Nos. E-7, Sub 1115 and E-100, Sub 147, has been served by electronic mail, hand delivery or by depositing a copy in the United States mail, postage prepaid to the following parties of record:

David Drooz
Lucy Edmondson
Robert Gillam
Dianna Downey
Tim Dodge
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