

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1164

In the Matter of	)	TESTIMONY OF
Application of Duke Energy	)	DAVID M.
Carolinas, LLC, for Approval of	)	WILLIAMSON PUBLIC
Demand-Side Management and	)	STAFF – NORTH
Energy Efficiency Cost Recovery	)	CAROLINA UTILITIES
Rider Pursuant to G.S. 62-133.9 and	)	COMMISSION
Commission Rule R8-69		

**May 22, 2018**

1   **Q.   PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND**  
2       **PRESENT POSITION.**

3   A.   My name is David M. Williamson. My business address is  
4       430 North Salisbury Street, Dobbs Building, Raleigh, North Carolina.  
5       I am a Utilities Engineer with the Electric Division of the Public Staff,  
6       North Carolina Utilities Commission.

7   **Q.   BRIEFLY STATE YOUR QUALIFICATIONS AND DUTIES.**

8   A.   My qualifications and duties are included in Appendix A.

9   **Q.   WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

10  A.   The purpose of my testimony is to present the Public Staff's analysis  
11       and recommendations with respect to the following aspects of the  
12       March 7, 2018 application of Duke Energy Carolinas, LLC (DEC),  
13       for approval of its demand-side management (DSM) and energy  
14       efficiency (EE) cost recovery rider for 2019 (Rider 10):  
15       (1) the portfolio of DSM and EE programs included in the proposed  
16       Rider 10, including modifications of those programs made pursuant  
17       to the joint motion regarding program modifications approved on July  
18       16, 2012, in Docket No. E-7, Sub 831 (Flexibility Guidelines); (2) the  
19       ongoing cost-effectiveness of each DSM and EE program; and (3)  
20       the evaluation, measurement, and evaluation (EM&V) studies filed

1 as Exhibits A through L to the testimony of Company witness Robert  
2 P. Evans.

3 **Q. WHAT DOCUMENTS HAVE YOU REVIEWED IN YOUR**  
4 **INVESTIGATION OF DEC'S PROPOSED RIDER 10?**

5 A. I reviewed the application and supporting testimony and exhibits, as  
6 well as DEC's responses to Public Staff data requests. In addition,  
7 I reviewed previous Commission orders related to DEC's DSM and  
8 EE programs and cost recovery rider proceedings, including the  
9 following documents:

- 10 1. The Agreement and Joint Stipulation of Settlement (Sub 831  
11 Agreement) approved on February 9, 2010, in Docket No.  
12 E-7, Sub 831;
- 13 2. The agreement regarding EM&V approved on November 8,  
14 2011, in Docket No. E-7, Sub 979 (EM&V Agreement),
- 15 3. The Flexibility Guidelines;
- 16 4. The Agreement and Stipulation of Settlement (Sub 1032  
17 Agreement) approved on October 29, 2013, in Docket  
18 No. E-7, Sub 1032 (Sub 1032 Order), which approved a new  
19 DSM/EE Cost Recovery Mechanism that incorporated the  
20 EM&V Agreement and the Flexibility Guidelines (Sub 1032  
21 Mechanism); and

1           5.    The Commission's *Order Approving DSM/EE Rider, Revising*  
2                   *DSM/EE Mechanism, and Requiring Filing of Proposed*  
3                   *Customer Notice* issued August 23, 2017, in Docket No.  
4                   E-7, Sub 1130 (Sub 1130 Order) that approved revisions to the  
5                   Sub 1032 Mechanism (Revised Mechanism).

6   **Q.    DO YOU HAVE ANY EXHIBITS?**

7    A.    Yes. I have included three exhibits with my testimony. Williamson  
8           Exhibit No. 1 shows the changes in the cost-effectiveness of the  
9           Company's programs as calculated by the Company in its 2016,  
10          2017, and current DSM/EE rider proceedings. Williamson Exhibit  
11          No. 2 shows the difference in the cost-effectiveness calculations of  
12          each program using the Company's methodology of determining  
13          avoided capacity benefits as opposed to the methodology that the  
14          Public Staff believes is required by the Revised Mechanism.  
15          Williamson Exhibit No. 3 provides a historical look at the cost-  
16          effectiveness of the Company's Residential Smart \$aver EE  
17          Program.

1 DSM and EE Programs in Rider 10

2 **Q. PLEASE IDENTIFY THE DSM AND EE PROGRAMS FOR WHICH**  
3 **DEC IS SEEKING COST RECOVERY THROUGH THE DSM/EE**  
4 **RIDER IN THIS PROCEEDING.**

5 A. In its proposed Rider 10, DEC included the costs and incentives  
6 associated with the following programs:

- 7 • Energy Assessments;
- 8 • EE Education;
- 9 • Residential Smart \$aver<sup>®</sup> Energy Efficient Appliances and  
10 Devices;
- 11 • Residential Smart \$aver<sup>®</sup> EE (formerly the HVAC EE  
12 Program);
- 13 • Multi-Family EE;
- 14 • My Home Energy Report (MyHER);
- 15 • Income-Qualified (formerly Low Income) Energy Efficiency  
16 and Weatherization Assistance;
- 17 • Power Manager;
- 18 • Nonresidential Smart \$aver<sup>®</sup> Energy Efficiency Food Service  
19 Products;
- 20 • Nonresidential Smart \$aver<sup>®</sup> Energy Efficiency HVAC  
21 Products;
- 22 • Nonresidential Smart \$aver<sup>®</sup> Energy Efficiency IT Products;

- 1           • Nonresidential Smart \$aver<sup>®</sup> Energy Efficiency Lighting
- 2           Products;
- 3           • Nonresidential Smart \$aver<sup>®</sup> Energy Efficiency Process
- 4           Equipment Products;
- 5           • Nonresidential Smart \$aver<sup>®</sup> Energy Efficiency Pumps and
- 6           Drives;
- 7           • Nonresidential Smart \$aver<sup>®</sup> Energy Efficiency Custom;
- 8           • Nonresidential Smart \$aver<sup>®</sup> Custom Energy Assessments;
- 9           • PowerShare<sup>®</sup>;
- 10          • Power Share<sup>®</sup> Nonresidential Call Option<sup>1</sup>;
- 11          • Small Business Energy Saver;
- 12          • Smart Energy in Offices<sup>2</sup>;
- 13          • EnergyWise for Business; and,
- 14          • Nonresidential Smart \$aver<sup>®</sup> Performance Incentive.

15           Each of these programs has received Commission approval as a  
16           new DSM or EE program and is eligible for cost recovery in this  
17           proceeding under G.S. 62-133.9, subject to certain program-specific  
18           conditions imposed by the Commission.

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<sup>1</sup> Commission Order in Sub 1130 dated August 23, 2017, approving program cancellation effective January 31, 2018.

<sup>2</sup> Commission Order dated February 7, 2018, approving program cancellation effective June 30, 2018.

1 Since program approval, DEC has modified several of these  
2 programs to add or remove measures, consistent with the Flexibility  
3 Guidelines, to enhance the programs' cost-effectiveness and  
4 address changing market conditions and technologies. In each  
5 case, DEC either sought Commission approval or provided notice of  
6 those modifications in compliance with those guidelines.

7 Program Performance

8 **Q. PLEASE DISCUSS THE PERFORMANCE OF THE PORTFOLIO.**

9 A. While the testimony and exhibits of DEC witness Evans provide  
10 information regarding the performance of each program in DEC's  
11 portfolio, I want to bring certain information to the Commission's  
12 attention regarding the performance of particular programs,  
13 as well as the performance of DEC's overall portfolio.  
14 While the portfolio of programs seems generally to be performing  
15 satisfactorily, the level of savings obtained from non-specialty  
16 light-emitting diode (LED) lighting-related measures and the  
17 My Home Energy Report (MyHER) program merit further discussion.  
18 I also discuss the performance of other programs that are struggling  
19 to remain cost-effective.

20 **Q. PLEASE DISCUSS YOUR OBSERVATIONS CONCERNING**  
21 **LIGHTING-RELATED MEASURES.**

1 A. As mentioned by Company witness Evans, savings from lighting-  
2 related measures continue to provide a significant portion of the  
3 savings in the portfolio. A review of the workpapers supporting  
4 page 4 of Evans Exhibit 1 suggests that in 2017, over 25% of the  
5 residential kWh savings and over 75% of the non-residential kWh  
6 savings came from lighting-related measures. These two lighting  
7 profiles, residential and non-residential, are comprised of both  
8 specialty and non-specialty bulbs. I have serious concerns about the  
9 future of the non-specialty bulbs incorporated in the Company's  
10 portfolio, which I discuss below.

11 In the Sub 1130 proceeding, the Public Staff highlighted several  
12 trends with the adoption of EE lighting measures, i.e., that the  
13 EE lighting market is being transformed and that non-specialty  
14 LED lighting will likely become the baseline standard for general  
15 service bulb technologies by January 2020, thereby decreasing  
16 savings from EE lighting programs. Those trends continue.  
17 Furthermore, I have not observed any new information that would  
18 suggest that federal proposals to revise lighting standards<sup>3</sup> are being  
19 delayed or modified.

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<sup>3</sup><https://www.federalregister.gov/documents/2017/01/19/2016-32012/energy-conservation-program-energy-conservation-standards-for-general-service-lamps>



1 DEC's market potential study (MPS) of EE programs, which was  
2 finalized last year, includes several lighting-related measures that  
3 only recognize savings through 2021.

4 Market transformation is difficult to determine because the metrics  
5 associated with market transformation are subjective. However,  
6 one of the purposes of utility EE programs is to encourage  
7 consumers to adopt EE on their own. As technologies become more  
8 energy efficient, costs decrease, consumer acceptance improves,  
9 adoption of EE should become more routine. For example, the free  
10 ridership calculation in the Energy Efficient Appliances and Devices  
11 Program Final Evaluation Report, Evans Exhibit K,<sup>4</sup> which covers  
12 calendar year 2016 through March of 2017, shows that the free  
13 ridership of the Free LED program is 50%, suggesting that one-half  
14 of the gross program savings would have been achieved even if the  
15 program did not exist.

16 I have also learned that the Company has commissioned a  
17 "shelving study"<sup>5</sup> for lighting measures. The results from this study  
18 should be finalized later this year and should provide some very

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<sup>4</sup> Free ridership is any action a participant would have taken anyway, regardless of the program or incentive to encourage the action.

<sup>5</sup> A shelving study determines what types of bulbs are present in the North Carolina marketplace and the bulb types that are dominating retail shelf space.

1           useful data to assess future lighting technology baselines and the  
2           degree to which North Carolina's market has been transformed.

3           Regardless of the new standard and barring any new technology for  
4           lighting, it appears that the lighting market may be close to adopting  
5           EE lighting technologies as a baseline and that further incentives for  
6           certain EE lighting measures for certain customers may not be  
7           necessary after January 1, 2020.<sup>6</sup> In DEC's 2019 rider proceeding,  
8           the Company will file for rates to be effective for the 2020 rate period.  
9           I recommend that the Company include in its 2019 DSM/EE rider  
10          filing its plans to incorporate the impacts identified in the lighting  
11          shelving study, including any baseline changes for non-specialty LED  
12          bulb lighting technology in its EE programs.

13   **Q.     PLEASE DISCUSS YOUR OBSERVATIONS CONCERNING THE**  
14   **MYHER PROGRAM.**

15   A.     The MyHER program provides periodic reports to customers that  
16          compare their household energy consumption patterns to those of  
17          other similarly situated, nearby households. The reports provide a  
18          summary of energy use compared to the customer's neighbors, and  
19          also provide energy savings tips to encourage customers to reduce

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<sup>6</sup><http://www.nmrgroupinc.com/wp-content/uploads/2017/09/Davids-poster-description.pdf>

1 energy consumption. As illustrated on page 4 of Evans Exhibit 1,  
2 for Vintage year 2017, approximately two-thirds of the energy  
3 savings and three-quarters of the peak demand savings of the  
4 residential portfolio were derived from the MyHER program.

5 As indicated in its recent general rate case (Docket No.  
6 E-7, Sub 1146), the Company has started modernizing its grid, in part  
7 by updating its metering technology and billing software that will  
8 allow its customers to access their energy consumption data in a  
9 more manageable format. The Company is currently replacing its  
10 existing meters with Advanced Metering Infrastructure (AMI) meters,  
11 as well as replacing and updating its customer information system.  
12 Between 2013 and the end of 2017, DEC replaced approximately  
13 35% of its total base of meters across its North Carolina service  
14 territory with AMI meters. The Company also plans to completely  
15 update and replace its billing software and customer information  
16 system over the next three to four years.

17 As the Company moves closer to being able to provide daily  
18 information through the use of AMI and its customer information  
19 systems, there may be some redundancy in the information available  
20 through these new systems and the information provided through the  
21 MyHER program. The EM&V for the MyHER program will need to

1 clearly isolate any savings associated with enhanced access to  
2 customer data provided through AMI and customer information  
3 systems from the impacts solely attributable to the customized  
4 suggestions for the home provided by the MyHER program.

5 The current MyHER EM&V report filed in this proceeding as Evans  
6 Exhibit C contains a list of key findings, two of which I note:  
7 (1) 94% of respondents recalled receiving at least one MyHER, with  
8 96% of those that recalled receiving a MyHER indicating that they  
9 “always” or “sometimes” read the reports; (2) Respondents reported  
10 that the most useful feature of the reports was the graphs illustrating  
11 the home’s energy usage over time, and the least useful feature was  
12 the customized suggestions for the home. Thus, while respondents  
13 appear to generally read the MyHER, much of the energy usage  
14 information that they find most useful will be, or at least should be,  
15 available through AMI and new billing functionalities.

16 The Public Staff will continue to work with DEC to evaluate the  
17 MyHER program to ensure that it produces verifiable and cost  
18 effective energy savings as the Company develops its technology  
19 base and provides customers with new functionalities.

1                                    Revisions to the Mechanism Approved in Sub 1130

2    **Q.    PLEASE DISCUSS THE REVISIONS TO THE SUB 1032**  
3                    **MECHANISM APPROVED IN THE SUB 1130 ORDER.**

4    A.    As proposed by DEC and the Public Staff, and approved by the  
5            Commission in Sub 1130, revisions to the DEC DSM/EE Mechanism  
6            were made to better align the avoided cost rates used for DSM/EE  
7            Portfolio Performance Incentive (PPI) calculations, PPI true-up, and  
8            program cost-effectiveness evaluations with the current avoided cost  
9            rates being implemented by the Company.<sup>7</sup> Details of this change  
10          are discussed more fully in the testimony of Public Staff witnesses  
11          Eric L. Williams and Michael C. Maness.

12                                Impact on Portfolio Cost-Effectiveness of the Mechanism Revisions

13   **Q.    PLEASE DISCUSS THE IMPACTS TO THE PORTFOLIO AS A**  
14                    **RESULT OF THE REVISIONS TO THE MECHANISM APPROVED**  
15                    **IN THE SUB 1130 ORDER.**

16   A.    In the last rider proceeding, the underlying avoided costs utilized for  
17          calculation of avoided energy and avoided capacity values were

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<sup>7</sup> Similar changes were made to the evaluation process for new programs in the Revised Mechanism but are not in issue in this proceeding. However, the Commission's decision in this proceeding should apply to the evaluation of avoided capacity values for new programs.

1 derived from the 2012 IRP<sup>8</sup> and the 2012 Avoided Cost Proceeding,<sup>9</sup>  
2 respectively. Public Staff witness Eric Williams discusses the  
3 reasons that the Public Staff and Company chose to propose  
4 revisions to the Sub 1032 Mechanism regarding the source of the  
5 avoided energy and capacity values. Under the Revised  
6 Mechanism, the underlying avoided costs utilized for calculation of  
7 avoided energy and capacity values in this proceeding are  
8 derived from the Avoided Cost Proceeding approved as of  
9 December 31, 2017, in Docket No. E-100, Sub 148 (Sub 148).

10 While the changes in program cost effectiveness from last year's to  
11 the current year's rider filing are not solely attributable to the avoided  
12 cost changes to the Mechanism, the impact of the change in avoided  
13 cost rates is significant. This change in avoided costs updated the  
14 underlying assumptions for the inputs of both avoided energy and  
15 avoided capacity. As proposed by the Company, this decreased the  
16 impacts on a net present value dollar amount by 40-50% for avoided  
17 energy rates and approximately 10% for avoided capacity rates.<sup>10</sup>

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<sup>8</sup> Docket No. E-100, Sub 137

<sup>9</sup> Docket No. E-100, Sub 136

<sup>10</sup> These decreases in avoided cost were provided to the Public Staff in the Sub 1130 proceeding. These percentages were Company projections of avoided energy and avoided capacity values that could result from the Sub 148 avoided cost proceeding, since an Order by the Commission had not been issued at the time of that rider proceeding.

1 Williamson Exhibit No. 1<sup>11</sup> shows the aggregate impact on program  
2 cost-effectiveness which includes updates to avoided cost sources,  
3 EM&V, and program participation.

4 Cost Effectiveness

5 **Q. HOW IS THE COST EFFECTIVENESS OF DEC'S DSM AND EE**  
6 **PROGRAMS EVALUATED?**

7 A. The Public Staff reviews the cost-effectiveness of the individual  
8 DSM/EE programs to determine if their benefits outweigh the costs  
9 when they are proposed for approval and then annually in the rider  
10 proceedings on an ongoing basis. Pursuant to the Revised  
11 Mechanism, cost-effectiveness is evaluated at both the program and  
12 portfolio levels. The Public Staff reviews cost-effectiveness using the  
13 Utility Cost (UC), Total Resource Cost (TRC), Participant, and  
14 Ratepayer Impact Measure (RIM) tests. Under each of these  
15 four tests, a result above 1.0 indicates that a program is  
16 cost-effective.

17 The TRC test represents the overall net system and participant  
18 benefits that will result from implementation of the program; a result

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<sup>11</sup> The Non-Residential Smart Saver Custom and Custom Energy Assessment programs are listed separately in this Exhibit, but have recently been treated as part of the same program, with a combined TRC value of 1.04.

1 greater than 1.0 indicates that the overall system benefits outweigh  
2 the costs of a program to both the utility and the program's  
3 participants. A UC test result greater than 1.0 means that the  
4 program is cost beneficial<sup>12</sup> to the utility system (the overall system  
5 benefits are greater than the utility's costs, including incentives paid  
6 to participants). The RIM test is used to understand how ratepayers  
7 who do not participate in a program will be impacted by the program.

8 **Q. HOW IS COST-EFFECTIVENESS EVALUATED IN DSM/EE RIDER**  
9 **PROCEEDINGS?**

10 A. In each DSM/EE rider proceeding, DEC files the expected  
11 cost-effectiveness of each program and the portfolio as a whole for  
12 the upcoming rate period (Evans Exhibit 7). New DSM/EE programs  
13 are approved under Commission Rule R8-68, which evaluates cost-  
14 effectiveness over a three-to five year period using estimates of  
15 participation and measure attributes that can be reasonably  
16 expected over that period. The evaluations in DSM/EE rider  
17 proceedings look more specifically at the actual performance of a  
18 typical measure, providing an indication of what to expect in the next

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<sup>12</sup> "Cost beneficial" in this sense represents the net benefit achieved by avoiding the need to construct additional generation, transmission, and distribution facilities related to providing electric utility service, and/or avoiding energy generation from existing or new facilities or purchased power.



1           year. Each year's rider filing is updated with the most current EM&V  
2           data and other program performance data.

3   **Q.   HOW DOES THE PUBLIC STAFF ASSESS COST-**  
4   **EFFECTIVENESS IN EACH RIDER?**

5   A.   The Public Staff compares the cost-effectiveness test results in  
6       previous DSM/EE proceedings to the current filing, and develops a  
7       trend of cost-effectiveness that serves as the basis for the Public  
8       Staff's recommendation on whether a program should be terminated.

9   **Q.   HOW DO THE COST-EFFECTIVENESS TEST SCORES FILED IN**  
10   **THIS RIDER COMPARE TO SCORES IDENTIFIED IN PREVIOUS**  
11   **RIDERS?**

12   A.   While many programs continue to be cost effective, the TRC scores  
13       as filed by the Company for all programs have decreased since the  
14       2017 DSM/EE rider proceeding, mainly due to the changes in  
15       avoided cost rate determinations, as mentioned earlier. These  
16       changes are shown in Williamson Exhibit No. 1.

17   **Q.   ARE THERE OTHER REASONS FOR THESE DIFFERENCES?**

18   A.   The decreasing cost-effectiveness is also partially attributable to  
19       anticipated unit savings being lower than expected as determined  
20       through EM&V of the program. Also, as programs mature, baseline

1 standards increase, or avoided cost rates decrease, it becomes  
2 more difficult for a program to produce cost-effective savings. On  
3 the other hand, greater than expected participation usually results in  
4 greater savings per unit cost.

5 **Q. DOES THE PUBLIC STAFF AGREE WITH DEC'S**  
6 **CALCULATIONS OF COST-EFFECTIVENESS FILED IN THIS**  
7 **PROCEEDING?**

8 A. No. Based on the information provided in response to the Public  
9 Staff's data requests and in conversations with the Company  
10 representatives who perform the DSMore modeling, the Public Staff  
11 believes that determinations of cost-effectiveness were not based on  
12 the avoided capacity rates approved by the Commission in Sub 148.  
13 These avoided capacity rates should reflect zero avoided capacity  
14 values in years prior to the identified need for new capacity in the  
15 underlying IRP (in this case the 2016 IRP) that serves as the basis  
16 for the avoided capacity rate calculations.

17 **Q. UNDER DEC'S CALCULATIONS OF COST-EFFECTIVENESS,**  
18 **ARE THERE ANY PROGRAMS THAT ARE NOT COST-**  
19 **EFFECTIVE FOR VINTAGE 2019?**

20 A. Yes. Evans Exhibit 7 indicates that the Residential Smart \$aver EE  
21 Program (formerly, HVAC EE) (TRC of 0.59 and a UC of 0.94),

1 the Income-Qualified EE and Weatherization program (low-income)  
2 (TRC of 0.83 and a UC of 0.19), the EnergyWise for Business  
3 program (TRC of 1.21 and a UC of 0.83), and the Non-Residential  
4 Smart \$aver Performance Incentive (TRC of 0.81 and a UC of 2.70),  
5 are not cost-effective under either the TRC or UC test, or both.

6 **Q. WHAT ARE THE IMPACTS ON THE COST-EFFECTIVENESS OF**  
7 **THE PORTFOLIO WHEN APPLYING ZERO CAPACITY VALUE**  
8 **FOR YEARS PRIOR TO 2023?**

9 A. Williamson Exhibit 2 shows the change in cost-effectiveness scores  
10 for each program when no capacity value is given for years that  
11 DEC's 2016 IRP does not show a capacity need. I note that  
12 programs with measures having measure lives extending to 2023  
13 and beyond do include a capacity payment for those periods when  
14 the IRP shows a capacity need. Besides the four programs,  
15 mentioned above, shown to be not cost-effective under DEC's  
16 calculations, use of the Public Staff's methodology shows that the  
17 Non-Residential Smart \$aver Custom/Assessments program<sup>13</sup>  
18 would also not be cost-effective for vintage 2019.

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<sup>13</sup> While Williamson Exhibit 2 may represent these two programs separately, the Company has combined these two programs for purposes of cost-effectiveness because of their similar nature and participation. The combined TRC value for the Smart \$aver Custom/Assessments program is 0.97.

1    **Q.    WHAT ACTIONS DO YOU RECOMMEND THAT THE**  
2           **COMMISSION TAKE REGARDING THE NON-COST EFFECTIVE**  
3           **PROGRAMS PURSUANT TO THE REVISED MECHANISM?**

4    A.    As part of the Revised Mechanism, the Company and the Public Staff  
5           agreed on a procedure for programs that are not cost effective.  
6           Under Paragraph 23 and Paragraphs 23A-D of the Revised  
7           Mechanism, for any program that initially demonstrates a TRC of less  
8           than 1.00, the Company will include in its annual DSM/EE rider  
9           filing a discussion of the actions being taken to maintain or  
10          improve cost-effectiveness, or alternatively, its plans to terminate the  
11          program. If a program demonstrates a prospective TRC of less  
12          than 1.00 in a second DSM/EE rider proceeding, the Company will  
13          include a discussion of what actions it has taken to improve  
14          cost-effectiveness. If a program demonstrates a prospective TRC of  
15          less than 1.00 in a third DSM/EE rider proceeding, the Company will  
16          terminate the program effective at the end of the year following the  
17          DSM/EE rider order, unless otherwise ordered by the Commission.  
18          This approach provides ample time for program modifications to  
19          improve cost-effectiveness. I discuss below my recommendations  
20          regarding the programs in this rider proceeding that have an ongoing  
21          TRC of less than 1.0:

- 1           • The Income-Qualified EE and Weatherization program  
2           (low-income) was hit with a major decrease in cost-  
3           effectiveness due largely to the update of the avoided cost  
4           sources, as illustrated in Williamson Exhibit No. 1. However,  
5           as a matter of policy,<sup>14</sup> low-income programs are not required  
6           to meet the cost effectiveness test thresholds that other  
7           programs must meet in order to be considered for  
8           continuation.
- 9           • The EnergyWise for Business program is a demand-side  
10          management program that draws the majority of its avoided  
11          benefits from capacity and transmission and distribution  
12          (T&D) reductions. Using the Company's application of  
13          avoided capacity costs, this program is cost effective under  
14          the TRC test; however, when using the Public Staff's  
15          methodology, this program is no longer cost effective,  
16          as illustrated in Williamson Exhibit No. 2. Pursuant to  
17          Paragraph 23B, the Company should provide a discussion of  
18          the actions being taken to maintain or improve cost-  
19          effectiveness, or alternatively, its plans to terminate the  
20          program. Pursuant to Paragraph 23C of the Revised

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<sup>14</sup> Low income programs are intended to provide EE measures to a sector of customers who would not otherwise participate in an EE program on their own.

1 Mechanism, if this program shows a prospective TRC of less  
2 than 1.00 in next year's DSM/EE rider proceeding, the  
3 Company should include a discussion of what actions it has  
4 taken to improve cost-effectiveness.

5 • The Non-residential Smart \$aver Performance Incentive  
6 program was approved in the fall of 2016 and launched in  
7 January 2017. In the Sub 1130 proceeding, this program  
8 was not cost-effective, but was still too new to assess  
9 its full potential. This year it is again not cost-effective,  
10 but because of its status last year, I consider this program to  
11 fall under paragraph 23B of the Revised Mechanism.  
12 Thus, I recommend that in its rebuttal or supplemental  
13 testimony in this proceeding, the Company provide a  
14 discussion of the actions being taken to maintain or improve  
15 cost-effectiveness, or alternatively, its plans to terminate the  
16 program. Further, if this program is again not cost-effective at  
17 the time of the next rider filing, the Company should include a  
18 discussion in that proceeding of the actions taken to improve  
19 cost-effectiveness pursuant to Paragraph 23C of the Revised  
20 Mechanism.

21 • Non-Residential Smart Saver Customer Energy Assessments  
22 and Non-Residential Smart Saver Custom programs were

1 filed separately in the last proceeding, but since then,  
2 the Company has decided to combine these two programs for  
3 purposes of program performance due to their similarities,  
4 including target participants. Under the combined efforts,  
5 the cost effectiveness of these two programs shows a TRC  
6 greater than 1.00; however, when applying the Public Staff's  
7 methodology, the combined program is no longer cost  
8 effective. Pursuant to Paragraph 23B, the Company should  
9 provide a discussion of the actions being taken to maintain or  
10 improve cost-effectiveness, or alternatively, its plans to  
11 terminate the program. Pursuant to Paragraph 23C of the  
12 Revised Mechanism, if the combined program show a  
13 prospective TRC of less than 1.00 in next year's DSM/EE rider  
14 proceeding, the Company should include a discussion of the  
15 actions taken to improve cost-effectiveness.

16 • With respect to the Residential Smart \$aver EE program  
17 (formerly, HVAC EE program), as explained below, I believe  
18 this program should be terminated or suspended effective at  
19 the end of the year.

1 Q. WHY ARE YOU RECOMMENDING SUSPENSION OR  
2 TERMINATION OF THE RESIDENTIAL SMART \$AVER EE  
3 PROGRAM?

4 A. The Residential Smart \$aver EE program has struggled to achieve  
5 cost-effectiveness for several years because of (1) higher efficiency  
6 standards mandated by the federal government, which has  
7 increased baselines against which savings impacts have been  
8 measured, and (2) the need for large participant incentives to  
9 overcome the upfront out-of-pocket costs to participants. Williamson  
10 Exhibit No. 3 provides the history of TRC test performances for this  
11 program as filed by the Company. As illustrated by Evans Exhibit 7,  
12 the program continues to fail the TRC test for vintage 2019.

13 DEC has expressed a strong desire to the Public Staff to continue  
14 offering a residential HVAC replacement program. With HVAC being  
15 one of the largest energy-consuming appliances in the home, I agree  
16 that an EE program that encourages adoption of high efficiency  
17 HVAC equipment is a fundamental EE program for a utility EE  
18 portfolio. I also understand that it is critical to maintain a good vendor  
19 network that provides customers with accurate, reliable information  
20 on HVAC energy consumption and other assistance.



1 In the Sub 1130 proceeding, Public Staff witness Floyd  
2 recommended that the Company either terminate the program or  
3 modify it to transition away from non-referral channel measures that  
4 are not cost-effective under the TRC, and instead focus more on  
5 referred measures. His recommendations were based upon the  
6 same cost-effectiveness and equipment cost trends that I have  
7 highlighted here. Witness Floyd recommended that the Company  
8 eliminate the non-referral channel from the portfolio because it  
9 was not cost-effective, and maintain the referral channel which was  
10 cost-effective. While the Company agreed with this  
11 recommendation, it has not removed the non-referral channel.

12 In the Sub 1130 proceeding, witness Floyd stated that approximately  
13 99% of the participation in the HVAC replacement measures of the  
14 program was through the non-referral channel. New data provided  
15 by the Company in this proceeding suggest that participation is  
16 shifting from the non-referral to the referral channel, with  
17 approximately 70% of the current participation coming through the  
18 referral channel. Nevertheless, documents provided to the Public  
19 Staff in this proceeding show that the referral channel is also not  
20 projected to be cost-effective for the calendar year 2019. While the  
21 data show that participation in this area of the program is growing,  
22 the amount of participation required to make it cost effective, along

1 with the updated avoided cost rates,<sup>15</sup> make it challenging for the  
2 referral channel to stay a viable option.

3 Williamson Exhibit No. 3 provides the calculated TRC scores that  
4 have been filed with the Commission since the program was  
5 approved in October 2013 (Sub 1032). The exhibit illustrates the  
6 ongoing struggle of the program to remain cost-effective.  
7 Since 2015, the Commission has approved two requests by the  
8 Company to modify the program<sup>16</sup> in an attempt to improve its  
9 cost-effectiveness. Unfortunately, these modifications have only  
10 made marginal improvements to cost-effectiveness. The main  
11 drivers decreasing cost-effectiveness continue to be the tighter  
12 efficiency standards and decreases in the avoided cost benefits.

13 **Q. DO YOU HAVE A PREFERENCE BETWEEN SUSPENSION AND**  
14 **TERMINATION OF THE RESIDENTIAL SMART \$AVER EE**  
15 **PROGRAM?**

16 A. While this program has continually struggled to attain and maintain  
17 cost-effectiveness, a residential HVAC program is a cornerstone

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<sup>15</sup> The program is not cost effective, regardless of the impact of updated avoided cost rates. However, the updated avoided cost rates make the program even less cost-effective.

<sup>16</sup> Modifications have included a new incentive structure and adoption of the referral channel.

1 program for any electric utility. Though termination may be  
2 warranted, I think it is preferable that the Company suspend this  
3 program until it can determine what is necessary for this program to  
4 attain and maintain cost-effectiveness. Based on the history of cost-  
5 effectiveness, the Company's lack of success at improving the cost-  
6 effectiveness of the program, and the projected TRC test cost-  
7 effectiveness score of only 0.59,<sup>17</sup> I recommend that the program be  
8 suspended effective December 31, 2018. Ratepayers should not be  
9 forced to pay for this program in its current form in light of its  
10 continued non-cost effectiveness and poor prospects for viability.  
11 The purpose of the review of program cost effectiveness is to allow  
12 struggling programs to recover, not to allow struggling programs to  
13 remain in the portfolio indefinitely.

14 **Q. WHAT IS THE STATUS OF PROGRAMS THAT WERE**  
15 **DETERMINED NOT TO BE COST EFFECTIVE IN THE SUB 1130**  
16 **PROCEEDING?**

17 A. Last year, the Business Energy Report pilot, the Non-Residential  
18 Smart \$aver Performance Incentive, and the Residential HVAC EE  
19 (now known as the Residential Smart \$aver EE) programs were  
20 determined not to be cost effective and the Company was instructed

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<sup>17</sup> This TRC score includes both the referral and non-referral channels.

1 to either improve cost-effectiveness or terminate these programs.  
2 The Company terminated the Business Energy Report pilot  
3 program<sup>18</sup> due to its poor cost-effectiveness. I have discussed the  
4 Non-Residential Smart \$aver Performance Incentive and Residential  
5 Smart Saver EE programs above.

6 EM&V

7 **Q. HAVE YOU REVIEWED THE EM&V REPORTS FILED BY DEC?**

8 A. The Public Staff contracted the services of GDS Associates, Inc., to  
9 assist it with review of EM&V. With GDS's assistance, I have  
10 reviewed the EM&V reports filed in this proceeding as Evans Exhibits  
11 A through L.

12 I also reviewed previous Commission orders to determine if DEC  
13 complied with provisions regarding EM&V contained in those orders.  
14 In the Sub 1130 DSM/EE rider proceeding for DEC, the Commission  
15 approved Public Staff witness Floyd's recommendations concerning:

16 1. Including a billing analysis and bulb replacement  
17 information in future evaluations of the Residential Multi-  
18 Family Energy Efficiency;

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<sup>18</sup> Commission Order terminating pilot was granted in Docket No. E-7, Sub 1081 on July 25, 2017, to be effective July 30, 2017.

- 1           2.     Reviewing the technological limits of water heaters and the  
2                 appropriateness of outlier data used in an engineering  
3                 analysis when evaluating the limitations of water heater to  
4                 produce savings in the Save Energy and Water Kits  
5                 measure;  
6           3.     Reviewing HVAC interactive effects, updating coincidence  
7                 factors for lighting measures, and tracking the type of  
8                 heating and cooling equipment used to estimate HVAC  
9                 interaction factors; and,  
10          4.     Reviewing the use of metering studies to determine the  
11                 hours-of-use for lighting measures installed in commercial  
12                 buildings in the Non-Residential Smart \$aver Energy  
13                 Efficient Products and Assessments – Prescriptive.

14   **Q.     DID DEC ADOPT THE PUBLIC STAFF’S RECOMMENDATIONS**  
15       **IN ITS EM&V REPORTS?**

- 16   A.     Yes. To the extent these recommendations are applicable to the  
17             EM&V reports filed in this proceeding, the reports incorporated  
18             Mr. Floyd’s recommendations. I understand that the Company’s  
19             EM&V evaluator intends to incorporate these recommendations in  
20             future EM&V reports as well.

1    **Q.    DO YOU HAVE ANY RECOMMENDATIONS CONCERNING THE**  
2           **EM&V REPORTS YOU REVIEWED?**

3    A.    Yes. I have reviewed the testimony and exhibits of DEC witness  
4           Evans concerning the EM&V of DEC's DSM and EE programs.  
5           Based upon my review, I have two recommendations that will impact  
6           the current and future analyses for the Non-Residential Smart Saver  
7           Custom program (Evans Exhibit B) and the MyHER program  
8           (Evans Exhibit C).

9    **Q.    PLEASE EXPLAIN YOUR EM&V-RELATED RECOMMENDATION**  
10          **REGARDING THE NON-RESIDENTIAL CUSTOM PROGRAM.**

11   A.    The savings and impacts of the Non-Residential Smart Saver  
12          Custom program (Evans Exhibit B) were evaluated by Cadmus  
13          for the 2013 to 2015 timeframe. The evaluation was conducted in  
14          three phases, the first by TecMarket Works<sup>19</sup> (TMW), and the latter  
15          two by Cadmus, after Cadmus acquired the assets of TMW in 2015.  
16          The evaluation included an assessment of free ridership which was  
17          used to develop a net-to-gross (NTG) ratio.

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<sup>19</sup> "Process and Impact Evaluation of the Non-Residential Smart Saver Prescriptive Program in the Carolina System: Lighting and Occupancy Sensors," dated April 5, 2013. Filed as Ham Exhibit F in Docket No. E-7, Sub 1050.

1       The methodology used to estimate free ridership involved a series of  
2       survey questions designed to determine the savings that are directly  
3       attributable to the program, and how much of those savings would  
4       have occurred even in the absence of the program. The key  
5       questions in this survey questionnaire included asking respondents  
6       to provide an incentive influence rating on a scale of 0-10 (how much  
7       the program incentive influenced their decision to participate in the  
8       program). Through the discovery process, the Public Staff learned  
9       that the scoring of the survey responses was not weighted in a linear,  
10      or symmetrical fashion. The Public Staff has previously  
11      recommended to the Commission<sup>20</sup> that if self-reporting survey  
12      responses are used to inform free ridership, that the evaluation  
13      should use a symmetrical scoring scale, unless an explanation is  
14      provided justifying the use of an asymmetrical scale in a particular  
15      instance.

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<sup>20</sup> *"If self-reporting responses are used to inform free-ridership, the evaluator should use a symmetrical scoring scale to calculate free-ridership. If the evaluator determines that a symmetrical scoring scale is not appropriate for a particular question, the evaluator will provide an explanation indicating why an asymmetrical scoring scale is appropriate in a particular instance. Any such explanation should be substantiated by a reference to supporting research or documentation citing a currently accepted industry practice."* Affidavit of Public Staff witness Jack Floyd, filed June 7, 2012 in Docket No. E-7, Sub 1101. <http://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=c1b5e2d8-007a-4b1a-b867-acfa22bc1b79>

1           The effect of using the asymmetrical scoring scale for this program  
2           is that the net savings increased by approximately 3%,  
3           or approximately 4,000,000 annual kWh. Based on the magnitude  
4           of the impact on net energy savings for the program, and the Public  
5           Staff's previous recommendation to the Commission on the matter,  
6           I recommend that DEC submit a revised report in the next DSM/EE  
7           rider proceeding in which the NTG scoring scale is adjusted so that  
8           it is symmetrical, giving equal weight to survey responses that favor  
9           the Company as well as those that do not favor the Company.

10   **Q.   PLEASE EXPLAIN YOUR EM&V-RELATED RECOMMENDATION**  
11           **REGARDING THE MYHER PROGRAM.**

12   A.   The savings and impacts of the MyHER program were evaluated by  
13           Nexant, (Evans Exhibit C) for the period of program participation  
14           spanning May 2015 to April 2016. Nexant relied upon a randomized  
15           control trial (RCT) to determine the savings of program participants.  
16           An RCT compares observed differences in energy consumption  
17           between the treatment group (program participants) and a control  
18           group (non-participants). A benefit of the use of an RCT is that it can  
19           isolate the observed differences between the treatment and control  
20           group to those which must be attributable to the program. In other  
21           words, the only difference in the change in consumption patterns



1 between the treatment and control groups over time is that one group  
2 is exposed to the home energy reports and the other is not.  
3 The Public Staff recognizes this approach to be a standard and best  
4 practice for the evaluation of residential behavioral programs that are  
5 similar or identical in nature to the MyHER program.

6 Nexant evaluated the program savings based on the timing of  
7 participation of different groups of customers called "cohorts."  
8 As the report describes, a cohort is a group of accounts that are  
9 added to the program at a given time. For this evaluation, there were  
10 three cohorts: the first included customers who began participating  
11 in 2010, the second included those who began participating between  
12 2012 and 2013, and the third included those who began participating  
13 between 2014 and 2015.

14 The annual kWh savings were found to vary by cohort as follows:

Cohort 1 (2010)	153 kWh
Cohort 2 (2012-2013)	135 kWh
Cohort 3 ((2014-2015)	319 kWh

Source: Table 3-11 of Evans Exhibit C shows point estimates for each cohort for the period May 2015 to April 2016.

15 The evaluation was unable to explain why the savings were so much  
16 higher among Cohort 3, when compared to the first two cohorts,

1 or identify any known differences between the three cohorts that  
2 would explain the difference. While the Public Staff has confidence  
3 in the methodology applied to complete this evaluation and believes  
4 that the overall savings appear to be reasonable and in line with the  
5 findings of other similar evaluations of residential behavioral savings  
6 in the United States, the Public Staff is unable to conclude its review  
7 of the overall findings and savings estimates put forth in the  
8 evaluation report. The Public Staff will continue to evaluate Evans  
9 Exhibit C and will coordinate with DEC to conduct additional review  
10 of the data used in the evaluation. Therefore, the Public Staff is not  
11 able to make a definitive recommendation on Evans Exhibit C  
12 and bring its review to a conclusion. Therefore, it is my  
13 recommendation that the results of the MyHER program evaluation  
14 be accepted conditionally for the purposes of this EE Rider  
15 proceeding. However, the Public Staff will continue to review this  
16 report and offer further recommendations in the next DSM/EE rider  
17 proceeding.

18 **Q. SHOULD THE EM&V REPORTS FILED IN THIS PROCEEDING BE**  
19 **ACCEPTED AS COMPLETE?**

20 A. With the exception of Evans Exhibits B and C as discussed above,  
21 the program vintages for which the remaining EM&V reports were

1 filed in this proceeding should be considered complete and do not  
2 require any adjustment to the impacts at this time. With respect to  
3 Evans Exhibits B and C, I believe it is appropriate to postpone  
4 accepting Evans Exhibit B as complete until a revised report is filed  
5 in the next rider proceeding, and also postpone accepting Evans  
6 Exhibit C until the Public Staff can conclude its review, which would  
7 be addressed in DEC's 2019 DSM/EE rider proceeding.

8 **Q. WERE THERE ANY EM&V REPORTS THAT WERE CARRIED**  
9 **OVER FROM LAST YEAR'S RIDER PROCEEDING AND LEFT**  
10 **OPEN FOR REVISION?**

11 A. Yes. In the Sub 1130 proceeding, Public Staff witness Floyd  
12 recommended that the EM&V reports for the Multifamily EE,  
13 Non-Residential Smart Saver Prescriptive Incentive, and Small  
14 Business Energy Saver programs (Evans Exhibits B, F, and J,  
15 respectively, filed in the Sub 1130 proceeding) be revised before  
16 accepting them as complete. These reports have been revised and  
17 submitted as Evans Exhibits H, I, and E, respectively, in this  
18 proceeding. The Public Staff's review indicates that the Company  
19 appropriately incorporated the Public Staff's previous  
20 recommendations into these EM&V reports. Therefore, I  
21 recommend that Evans Exhibits H, I, and E be considered complete  
22 for purposes of calculating program impacts in this proceeding.

1    **Q.    HAVE YOU CONFIRMED THAT THE COMPANY'S**  
2           **CALCULATIONS INCORPORATE THE VERIFIED SAVINGS OF**  
3           **THE VARIOUS EM&V REPORTS?**

4    A.    Yes. As in previous cost recovery proceedings, I was able, through  
5           sampling, to verify that the changes to program impacts and  
6           participation were appropriately incorporated into the rider  
7           calculations for each DSM and EE program, as well as the actual  
8           participation and impacts calculated with EM&V data. I reviewed:  
9           (1) workpapers provided in response to data requests; (2) a sampling  
10          of the EE programs; and (3) Evans Exhibit 1, which incorporates data  
11          from various EM&V studies. I also met with DEC personnel to review  
12          the calculations, EM&V, DSMore, and other data related to the  
13          program/measure participation and impacts. Based on my ongoing  
14          review of this data, I believe DEC has appropriately incorporated the  
15          findings from EM&V studies and annual participation into its rider  
16          calculations consistent with Commission orders and the Mechanism.  
17          I will continue to review this information and, if necessary, file further  
18          information with the Commission should my review reveal any  
19          relevant issues that would cause me to alter my recommendations  
20          or conclusions.

21           **Q.    DOES THIS CONCLUDE YOUR TESTIMONY?**

22           A.    Yes.

## APPENDIX A

## DAVID M. WILLIAMSON

I am a 2014 graduate of North Carolina State University with a Bachelor of Science Degree in Electrical Engineering. I began my employment with the Public Staff's Electric Division in March of 2015. My current responsibilities within the Electric Division include reviewing applications and making recommendations for certificates of public convenience and necessity of small power producers, master meters, and resale of electric service; reviewing applications and making recommendations on transmission proposals for certificates of environmental compatibility and public convenience and necessity; and also interpreting and applying utility service rules and regulations.

My primary responsibility within the Public Staff is reviewing and making recommendations on DSM/EE filings for initial program approval, program modifications, EM&V evaluations, and on-going program performance of DEC, DEP, and DENC's portfolio of programs. I filed an affidavit in DEP's 2016 DSM/EE rider proceeding in Docket No. E-2, Sub 1108, and testimony in DEP's 2017 DSM/EE rider proceeding in Docket No. E-2, Sub 1145.

Duke Energy Carolinas, LLC Comparison of "As-Filed" Cost-Effectiveness Scores to Previous DSM/EE Riders Docket Number E-7, Sub 1164					Williamson Exhibit No. 1									
	2016 - filing year vintage 2017 Evans Exhibit 7 in Sub 1105				2017 - filing year vintage 2018 Evans Exhibit 7 in Sub 1130				2018 - filing year vintage 2019 Evans Exhibit 7 in Sub 1164				TRC % Change	
	UCT	TRC	RIM	PCT	UCT	TRC	RIM	PCT	UCT	TRC	RIM	PCT		
<u>Residential Programs:</u>														
Appliance Recycling Program	-	-	-	-	-	-	-	-	-	-	-	-	-	
Energy Efficiency Education	1.50	2.00	0.57	-	1.72	2.32	0.90	-	1.22	1.69	0.53	-	-27%	
Energy Efficient Appliances & Devices	2.79	5.55	0.9	12.02	3.19	3.43	0.91	4.36	2.4	2.17	0.42	6.11	-37%	
Residential Smart Saver EE (formerly, HVAC EE)	-	-	-	-	1.60	0.99	0.83	1.39	0.94	0.59	0.45	1.52	-40%	
Income-Qualified Energy Efficiency and Weatherization Assistance	0.35	1.34	0.29	-	0.49	4.51	0.38	-	0.19	0.83	0.16	-	-82%	
Multi-Family Energy Efficiency	3.8	5.25	1.1	-	4.00	6.09	1.06	-	2.82	4.71	0.59	-	-23%	
My Home Energy Report	1.47	1.47	0.76	-	1.98	1.98	0.86	-	1.56	1.56	0.57	-	-21%	
Power Manager	4.29	7.92	4.29	-	5.18	10.33	5.18	-	4.33	8.86	4.33	-	-14%	
Residential Energy Assessments	3.4	3.63	1.43	-	2.65	3.05	1.06	-	1.41	1.56	0.54	-	-49%	
Residential Total	2.48	4.09	1.25	21.79	2.91	3.65	1.20	6.03	2.22	2.60	0.70	7.69	-29%	
<u>Non-Residential Programs:</u>														
Business Energy Report	1.78	1.78	0.78	-	1.39	1.39	0.71	-	-	-	-	-	-	
Non Residential Smart Saver Custom Energy Assessments	2.17	1.26	0.91	1.44	5.87	1.64	1.56	1.36	2.17	0.89	0.68	1.78	-46%	
Non Residential Smart Saver Custom	3.75	1.52	1.11	1.42	4.88	1.96	1.43	1.87	2.38	1.07	0.67	2.18	-45%	
EnergyWise For Business	1.65	2.36	1.13	-	1.44	2.70	0.94	-	0.83	1.21	0.68	-	-55%	
Non Residential Smart Saver Energy Efficient Food Service Products	3.27	2.25	1.08	2.96	4.44	2.74	1.21	2.65	2.68	1.95	0.61	3.18	-29%	
Non Residential Smart Saver Energy Efficient HVAC Products	2.26	1.73	1.17	1.45	3.41	2.11	1.53	1.29	2.04	1.63	0.88	1.82	-23%	
Non Residential Smart Saver Energy Efficient Lighting Products	3.73	1.7	1.18	1.72	4.12	1.96	1.16	1.61	3.48	1.44	0.74	2.17	-27%	
Non Residential Smart Saver Energy Efficient Pumps and Drives Products	3.57	2.49	1.1	2.81	3.71	3.51	0.85	3.35	2.54	2.45	0.54	3.56	-30%	
Non Residential Smart Saver Energy Efficient IT Products	3.47	2.53	0.93	3.82	4.14	2.34	0.89	3.16	2.36	1.77	0.59	3.79	-24%	
Non Residential Smart Saver Energy Efficient Process Equipment Products	7.17	5.93	1.35	5.83	2.39	2.42	0.85	2.67	2.13	2.23	0.47	4.21	-8%	
Non Residential Smart Saver Performance Incentive	-	-	-	-	3.53	1.14	1.29	1.08	2.7	0.81	0.69	1.50	-29%	
Small Business Energy Saver	2.51	2.56	1.12	2.28	3.91	2.50	1.46	2.38	2.59	1.61	0.77	3.00	-36%	
Smart Energy in Offices	2.52	3.47	0.83	-	3.75	5.84	1.69	-	-	-	-	-	-	
PowerShare Call Option	-	-	-	-	-	-	-	-	-	-	-	-	-	
PowerShare	2.8	23.42	1.88	-	3.24	60.80	2.05	-	2.9	41.14	2.90	-	-32%	
Non-Residential Total	3.00	2.27	1.22	1.99	3.94	2.50	1.41	2.04	2.69	1.67	0.85	2.41	-33%	
Overall Portfolio total:	2.76	2.78	1.23	2.90	3.44	2.88	1.31	2.78	2.46	1.98	0.78	3.48	-31%	

Duke Energy Carolinas, LLC  
Impacts of Company and Public Staff's Differing Methodologies of Avoided Capacity Costs  
Docket Number E-7, Sub 1164

Williamson Exhibit No. 2

Program	As Filed <sup>1</sup>				Public Staff 's Position				Delta <sup>2</sup>			
	UCT	TRC	RIM	PCT	UCT	TRC	RIM	PCT	UCT	TRC	RIM	PCT
<b>Residential Programs:</b>												
Energy Education Program for Schools	1.22	1.69	0.53		1.06	1.47	0.46		-13%	-13%	-13%	
Energy Efficient Appliances & Devices	2.40	2.17	0.42	6.11	2.21	2.00	0.39	6.11	-8%	-8%	-8%	0%
Smart Saver EE Program (formerly, HVAC EE)	0.94	0.59	0.45	1.52	0.87	0.55	0.42	1.52	-7%	-7%	-7%	0%
Income-Qualified EE Products & Services	0.19	0.83	0.16		0.17	0.74	0.14		-10%	-10%	-10%	
Multi-Family EE Products & Services	2.82	4.71	0.59		2.68	4.46	0.56		-5%	-5%	-5%	
My Home Energy Report	1.56	1.56	0.57		1.16	1.16	0.43		-25%	-25%	-25%	
Power Manager	4.33	8.86	4.33		1.98	4.05	1.98		-54%	-54%	-54%	
Residential Energy Assessments	1.41	1.55	0.54		1.32	1.45	0.50		-6%	-6%	-6%	
Residential Total	2.22	2.60	0.70	7.69	1.59	1.87	0.50	7.69	-28%	-28%	-29%	0%
<b>Non-Residential Programs:</b>												
Non Residential Smart Saver Custom Energy Assessments	2.17	0.89	0.68	1.78	2.01	0.82	0.63	1.78	-7%	-7%	-7%	0%
Non Residential Smart Saver Custom	2.38	1.07	0.67	2.18	2.21	0.99	0.62	2.18	-7%	-7%	-7%	0%
EnergyWise For Business	0.83	1.21	0.68		0.53	0.77	0.43		-37%	-37%	-37%	
Non Residential Smart Saver Energy Efficient Food Service Products	2.68	1.95	0.61	3.18	2.53	1.84	0.57	3.18	-5%	-5%	-5%	0%
Non Residential Smart Saver Energy Efficient HVAC Products	2.04	1.63	0.88	1.82	1.82	1.46	0.79	1.82	-11%	-11%	-11%	0%
Non Residential Smart Saver Energy Efficient Lighting Products	3.48	1.44	0.74	2.17	3.25	1.34	0.69	2.17	-7%	-7%	-7%	0%
Non Residential Smart Saver Energy Efficient Pumps and Drives Products	2.54	2.45	0.54	3.56	2.34	2.25	0.49	3.56	-8%	-8%	-8%	0%
Non Residential Smart Saver Energy Efficient IT Products	2.36	1.77	0.59	3.79	2.35	1.76	0.58	3.79	-1%	-1%	-1%	0%
Non Residential Smart Saver Energy Efficient Process Equipment Products	2.13	2.23	0.47	4.21	2.00	2.09	0.44	4.21	-6%	-6%	-6%	0%
Non Residential Smart Saver Performance Incentive	2.70	0.81	0.69	1.50	2.50	0.76	0.64	1.50	-7%	-7%	-7%	0%
Small Business Energy Saver	2.59	1.61	0.77	3.00	2.35	1.46	0.70	3.00	-10%	-10%	-10%	0%
PowerShare	2.90	41.14	2.90		1.32	18.78	1.32		-54%	-54%	-54%	
Non-Residential Total	2.69	1.67	0.85	2.41	2.23	1.39	0.70	2.41	-17%	-17%	-17%	0%
Overall Portfolio Total	2.46	1.98	0.78	3.48	1.92	1.55	0.60	3.48	-22%	-22%	-22%	0%

<sup>1</sup>Evans Exhibit 7 of the DSM/EE Rider Filing.

<sup>2</sup>This delta reflects the impacts of applying zero avoided capacity payments to years where the Company's 2016 IRP has designated that capacity is not needed.

Duke Energy Carolinas, LLC  
Timeline of Cost-Effectiveness for the Residential SmartSaver EE Program  
Docket Number E-7, Sub 1164

Williamson Exhibit 3

Date Filed	March 6, 2013	March 5, 2014	March 4, 2015	October 2, 2015	March 9, 2016		March 8, 2017	July 20, 2017	March 7, 2018
Filing Location	Rider Filing 2013 E-7, Sub 1031	Rider Filing 2014 E-7, Sub 1050	Rider Filing 2015 E-7, Sub 1073	E-7, Sub 1032 modification <sup>2</sup>	Rider Filing 2016 E-7, Sub 1105	E-7, Sub 1032 V2017 <sup>4</sup>	Rider Filing 2017 E-7, Sub 1130	E-7, Sub 1032 modification <sup>2</sup>	Rider Filing 2018 E-7, Sub 1164
Vintage Year	V2014 <sup>1</sup>	V2015 <sup>1</sup>	V2016 <sup>1</sup>		V2017 <sup>3</sup>		V2018 <sup>1</sup>		V2019 <sup>1</sup>
Residential Smart Saver EE Program (formerly, HVAC EE)	1.58	1.07	0.74	0.78	-	0.61	0.99	1.08	0.59

<sup>1</sup> Indicates a year long projection for purposes of a rider proceeding

<sup>2</sup> Indicates a multi-year TRC value for purposes of a modification filing

<sup>3</sup> Indicates a year where DEC states that data was not available to determine a cost-effectiveness score

<sup>4</sup> Indicates an actual calendar year end TRC value for vintage year 2017