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JUL 25 2008

Clerk's Office
N.C. Utilities Commission

July 25, 2008

Ms. Renné C. Vance, Chief Clerk
North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, North Carolina 27699-4325

RE: Docket No. E-7, Sub 856

Dear Ms. Vance:

Enclosed for filing are the original and 30 copies of Duke Energy Carolinas, LLC's Direct Testimonies of Janice D. Hager, Jane L. McManeus, Owen A. Smith and Ellen T. Ruff in the above referenced docket.

Sincerely,

Robert W. Kaylor
Robert W. Kaylor *RW*

Enclosures

cc: Parties of Record

Full Dist. mt

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 856

FILED

JUL 25 2008

Clerk's Office
N.C. Utilities Commission

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Application of Duke Energy Carolinas, LLC)	DIRECT TESTIMONY OF
For Approval of Solar Photovoltaic)	JANICE D. HAGER
Distributed Generation Program)	DUKE ENERGY CAROLINAS, LLC
And for Approval of Proposed Method of)	
Recovery of Associated Costs)	

1 **I. INTRODUCTION AND PURPOSE**

2 **Q: PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND POSITION**
3 **WITH DUKE ENERGY CORPORATION.**

4 A: My name is Janice D. Hager, and my business address is 526 South Church
5 Street, Charlotte, North Carolina. I am Managing Director, Integrated Resource
6 Planning and Environmental Strategy for Duke Energy Corporation's ("Duke
7 Energy") operating utilities, including Duke Energy Carolinas, LLC ("Duke
8 Energy Carolinas" or the "Company").

9 **Q: WHAT ARE YOUR CURRENT JOB RESPONSIBILITIES?**

10 A: I have responsibility for integrated resource planning and environmental
11 compliance planning for Duke Energy Corporation's regulated electric utilities,
12 including Duke Energy Carolinas. In that role, I oversee the long-term resource
13 planning for Duke Energy's Carolinas and Midwest operations, as well as
14 planning for environmental compliance. Duke Energy's long-range resource
15 planning process is conducted separately for each of the operating utilities.

16 **Q: PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL**
17 **BACKGROUND AND PROFESSIONAL AFFILIATIONS.**

18 A: I am a civil engineer, having received a Bachelor of Science in Engineering from
19 the University of North Carolina at Charlotte. I began my career at Duke Power
20 Company in 1981 and have had a variety of responsibilities across the Company
21 in areas of piping analyses, nuclear station modifications, new generation
22 licensing, rates, and regulatory affairs. I am a registered Professional Engineer in
23 North Carolina and South Carolina.

1 **Q: HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH**
2 **CAROLINA UTILITIES COMMISSION?**

3 A: Yes, I have testified before the North Carolina Utilities Commission
4 (“Commission”) on several occasions. I most recently appeared to present
5 testimony in support of Duke Energy Carolinas’ Energy Efficiency Plan, Docket
6 No. E-7, Sub 831.

7 **Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

8 A. The purpose of my testimony is to discuss how Duke Energy Carolinas’ proposed
9 solar photovoltaic (“PV”) distributed generation program (the “Program”)
10 conforms to the Company’s most recent integrated resource plan (“IRP” or
11 “Annual Plan”) as required by Commission Rule R8-61(b).

12 **II. THE PROGRAM CONFORMS TO THE COMPANY’S ANNUAL PLAN**

13 **Q: WHEN WAS DUKE ENERGY CAROLINAS’ MOST RECENT ANNUAL**
14 **PLAN FILED IN NORTH CAROLINA?**

15 A: The Company filed the 2007 Annual Plan (the “2007 Annual Plan”) with the
16 Commission on November 15, 2007, in Docket No. E-100, Sub 114. In its
17 application for approval of the Program filed on June 6, 2008, the Company
18 requested that the Commission take judicial notice of the 2007 Annual Plan. In
19 presenting the application at the Commission Staff Conference on July 7, 2008,
20 the Public Staff stated that it did not oppose the Commission taking judicial notice
21 of the 2007 Annual Plan. I therefore have not included another copy of the 2007
22 Annual Plan with my testimony. I note that item (2) of Commission Rule
23 R8-61(b) requires information and testimony on the extent to which the proposed

1 construction of the solar generating facilities under the Program conforms to the
2 Company's most recent biennial report. The Company's first biennial report is
3 required to be filed with this Commission by Sept. 1, 2008. In light of this fact, I
4 will discuss instead in my testimony how the application conforms to the 2007
5 Annual Plan.

6 **Q: PLEASE DESCRIBE THE PURPOSE OF THE COMPANY'S ANNUAL**
7 **PLAN?**

8 A: Duke Energy Carolinas' Annual Plan is developed with the objective of meeting
9 customers' needs for a highly reliable energy supply at the lowest reasonable cost.
10 Annually, Duke Energy Carolinas develops a resource plan for meeting
11 customers' energy needs. The resource plan considers a combination of (1)
12 existing power contracts, (2) existing and new generation, and (3) customer
13 options, including demand-side management ("DSM") programs and energy
14 efficiency ("EE") programs.¹ The Annual Plan has traditionally been filed with
15 the Commission and the Public Service Commission of South Carolina on an
16 annual basis. Going forward, as required by the Commission's recently updated
17 rules, a biennial plan will be filed with this Commission in even numbered years,
18 and a short term action plan will be filed annually.

19 **Q. PLEASE PROVIDE AN OVERVIEW OF THE INTEGRATED**
20 **RESOURCE PLANNING PROCESS FOR DUKE ENERGY CAROLINAS'**
21 **2007 ANNUAL PLAN.**

¹ In this testimony, I use the terms DSM to refer to load management programs such as air conditioning load control or industrial interruptible programs and EE to refer to conservation programs.

1 A. Duke Energy Carolinas has been engaged in integrated resource planning since
2 the late 1980s. The annual planning process begins with a 20-year load forecast.
3 The forecast includes projections of summer and winter peak demands, as well as
4 energy use. Information is gathered for Duke Energy Carolinas' existing
5 resources, including Company-owned generation, purchased power agreements,
6 and DSM/EE resources. The information includes items such as capacity rating,
7 heat rate, fuel costs and emission allowance costs. Data is gathered on the costs
8 of additional resource options to meet customer needs. Such data includes lead
9 times for construction, capacity costs, fixed and variable operating and
10 maintenance costs and emissions costs for generation, as well as the costs of
11 demand-side options. Quantitative analyses are conducted to identify
12 combinations of options that will meet customer energy needs (plus reserve
13 margin) while minimizing the costs to customers. The 2007 Annual Plan
14 incorporates a target planning reserve margin of 17%, which Duke Energy
15 Carolinas' experience has shown to be sufficient based on the prevailing
16 expectations of reasonable lead times for the development of new generation,
17 siting of transmission facilities and procurement of purchased capacity. These
18 quantitative analyses enable the Company to identify potential portfolios that can
19 be tested under base assumptions, and for sensitivities and scenarios around those
20 base assumptions.

21 **Q. ARE DECISIONS REGARDING RESOURCE PLANNING MADE ON**
22 **THE BASIS OF QUANTITATIVE ANALYSES ALONE?**

1 A. No. Consistent with the responsibility to meet customer energy needs in a reliable
2 and economic manner, the Company's resource planning approach includes both
3 quantitative analysis and qualitative considerations. Quantitative analysis
4 provides insights on the potential impacts of future risks and uncertainties
5 associated with fuel prices, load growth rates, capital and operating costs, and
6 other variables. Qualitative perspectives such as the importance of fuel diversity,
7 the Company's environmental profile, the stage of technology deployment, and
8 regional economic development are also important factors to consider as long-
9 term decisions are made regarding new resources. In the context of this
10 proceeding, compliance with the North Carolina Renewable Energy and Energy
11 Efficiency Standards ("REPS") is both a quantitative and a qualitative
12 consideration. It is quantitative in that there are quantitative analyses of the cost
13 of meeting the REPS. It is qualitative in that the decision on the resources
14 selected to meet the REPS is not made purely on economics, but with
15 consideration of factors such as portfolio diversity.

16 Company management uses all of these perspectives and analyses to
17 ensure that Duke Energy Carolinas will meet near-term and long-term customer
18 needs, while maintaining flexibility to adjust to evolving economic,
19 environmental, and operating circumstances in the future. The environment for
20 planning the Company's system has never been more dynamic. As a result, the
21 Company believes prudent planning for customer needs requires a plan that is
22 robust under many possible future scenarios, and maintains a number of options

1 to respond to many potential outcomes of major planning uncertainties (e.g.,
2 federal greenhouse gas emission legislation).

3 **Q. DID DUKE ENERGY CAROLINAS CONSIDER RENEWABLE ENERGY**
4 **RESOURCES IN DEVELOPING THE 2007 ANNUAL PLAN?**

5 A. Yes. Because of North Carolina's recent enactment of the REPS, Duke Energy
6 Carolinas modified its consideration of renewable energy resources. In previous
7 annual plans, resources were screened on economics. Therefore, renewable
8 resources were screened out due to their higher cost than traditional supply-side
9 resources. In the 2007 Annual Plan, renewable resources were screened
10 separately to identify the most cost-effective resources among the renewable
11 options. For the Carbon Case with CO2 regulation, the Renewable Portfolio
12 Standard assumptions are based on the REPS requirements. The assumptions for
13 planning purposes are as follows:

14 Overall Requirements/Timing

- 15 • 3% of 2011 load by 2012
- 16 • 6% of 2014 load by 2015
- 17 • 10% of 2017 load by 2018
- 18 • 12.5% of 2020 load by 2021

19 A portion of the REPS requirements was also assumed to be provided by EE and
20 DSM, co-firing biomass in some of Duke Energy Carolinas' existing units, and by
21 purchasing Renewable Energy Certificates (RECs) from out of state, as allowed in
22 the legislation. These requirements were applied to all native loads served by
23 Duke Energy Carolinas (i.e., both retail and wholesale, and regardless of the

1 location of the load) to take into account the potential that a Federal RPS may be
2 imposed that would affect all loads. Accordingly, the 2007 Annual Plan includes
3 160 MWs of renewable energy by 2012 and about 1000 MWs by 2020.

4 **Q: HOW DOES THE PROGRAM CONFORM TO THE COMPANY'S**
5 **ANNUAL PLAN?**

6 **A:** The integrated resource planning process for the 2007 Annual Plan demonstrates
7 that a combination of renewable resources, DSM/EE programs, and additional
8 baseload, intermediate, and peaking generation are required over the next twenty
9 years to reliably meet customer demand and the REPS requirements.

10 Duke Energy Carolinas' 2007 forecast shows average annual growth in
11 summer peak demand of 1.6 percent, winter peak demand growth of 1.4 percent,
12 and the average territorial energy growth rate of 1.4 percent. This equates to an
13 average annual growth rate of approximately 350 MWs per year of capacity and
14 1,500,000 megawatt-hours per year of energy. In addition, we have some existing
15 resources that will no longer be available to meet our customers' needs. Each
16 MW of capacity that is no longer available must be replaced with new capacity,
17 either from supply-side or demand-side resources. Accordingly, the 2007 Annual
18 Plan identifies the need for an additional 990 MWs by 2010 and 10,680 MW of
19 new resources to meet customers' energy needs by 2027. As shown in the
20 Company's 2007 Annual Plan, Duke Energy Carolinas currently has no
21 Company-owned solar PV generation facilities among its generation resources.
22 Implementation of the Program, therefore, would allow the Company to diversify
23 its resources used to reliably meet the energy needs of its customers.

1 Additionally, the Program will allow the Company to partially fulfill its
2 obligations under the REPS imposed by Senate Bill 3.

3 **Q. IN CONCLUSION, ARE THE SOLAR PV GENERATION FACILITIES**
4 **PROPOSED UNDER THE PROGRAM NEEDED AND CONSISTENT**
5 **WITH DUKE ENERGY CAROLINAS' 2007 ANNUAL PLAN?**

6 A. Yes. The facilities are an important and necessary part of Duke Energy
7 Carolinas' plans for meeting customer capacity and energy needs. I believe that
8 the Company's application is in the public convenience and necessity, and I ask
9 that the Commission approve it.

10 **Q: DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

11 A: Yes.

12

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 856

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Application of Duke Energy Carolinas, LLC)	DIRECT TESTIMONY OF
For Approval of Solar Photovoltaic)	JANE L. MCMANEUS
Distributed Generation Program)	DUKE ENERGY CAROLINAS, LLC
And for Approval of Proposed Method of)	
Recovery of Associated Costs)	

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I. INTRODUCTION AND PURPOSE

Q: PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A: My name is Jane L. McManeus, and my business address is 526 South Church Street, Charlotte, North Carolina.

Q: WHAT IS YOUR POSITION WITH DUKE ENERGY CAROLINAS, LLC?

A: I am Director, Rates for Duke Energy Carolinas, LLC (“Duke Energy Carolinas” or the “Company”). Duke Energy Carolinas is a wholly-owned subsidiary of Duke Energy Corporation (“Duke Energy”).

Q: WHAT ARE YOUR PRESENT RESPONSIBILITIES AT DUKE ENERGY CAROLINAS?

A: I am responsible for managing Duke Energy Carolinas’ fuel recovery processes, providing regulatory support for retail and wholesale rates, and providing guidance on compliance with regulatory conditions and codes of conduct.

Q: PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL AFFILIATIONS.

A: I graduated from Wake Forest University with a Bachelor of Science in Accountancy and received a Master of Business Administration degree from the McColl Graduate School of Business at Queens University of Charlotte. I am a certified public accountant licensed in the state of North Carolina, and am a member of the Southeastern Electric Exchange Rates and Regulation Section and the EEI Rate and Regulatory Analysts group. I began my career with Duke Energy Carolinas in 1979 as a staff accountant and have held a variety of

1 positions in the finance organizations. From 1994 until 1999, I served in financial
2 planning and analysis positions within the electric transmission area of Duke
3 Power. I was named Director, Asset Accounting for Duke Power in 1999, and
4 appointed to Assistant Controller in 2001. As Assistant Controller, I was
5 responsible for coordinating Duke Power's operational and strategic plans,
6 including development of the annual budget and performing special studies. I
7 joined the Rate Department in 2003 as Director, Rate Design and Analysis.
8 Beginning in April 2006, I became Director, Regulatory Accounting and Filings,
9 leading the regulatory accounting, cost of service, regulatory filings (including
10 fuel and fuel-related costs filings) and revenue analysis functions for Duke
11 Energy Carolinas. I began my current position in the Rate Department in October
12 2006.

13 **Q: HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH**
14 **CAROLINA UTILITIES COMMISSION?**

15 **A:** Yes, I have testified before the North Carolina Utilities Commission (the
16 "Commission") on several occasions. I most recently appeared to present
17 testimony in support of Duke Energy Carolinas' Fuel Filing, Docket No. E-7, Sub
18 847.

19 **Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

20 **A.** The purpose of my testimony is to (1) provide an overview of Duke Energy
21 Carolinas' proposed cost recovery model for its proposed solar photovoltaic
22 ("PV") distributed generation program (the "Program"); (2) estimate the impact of
23 the program on residential customer bills; and (3) describe how the Program's

1 costs relate to the annual customer class per-account caps specified in Senate Bill
2 3, the statute that established North Carolina’s Renewable Energy and Energy
3 Efficiency Portfolio Standard (“REPS”).

4 **II. COST RECOVERY AND RATE IMPACT OF PROGRAM**

5 **Q: WHAT METHODOLOGY IS THE COMPANY PROPOSING FOR**
6 **RECOVERY OF THE COST OF THE PROGRAM?**

7 A: As explained in Witness Ruff’s testimony, the Program directly responds to the
8 North Carolina General Assembly’s mandate to promote the development of
9 renewable energy, and contributes to the “Solar Carve Out” requirement in Senate
10 Bill 3. The Company, therefore, proposes to recover the cost of the Program
11 through the cost recovery mechanism provided for in Senate Bill 3 and the rules
12 the Commission has adopted under that statute (N.C. Gen. Stat. § 62-133.7(h) and
13 Commission Rule R8-67(e)). The Company plans to invest approximately \$100
14 million to install the solar facilities, and between \$700,000 and \$1.3 million
15 annually to operate and maintain the facilities. The Company believes that these
16 expenditures are reasonable and prudent costs that will be incurred in order to
17 comply with the requirements of the REPS (and specifically, N.C. Gen. Stat. § 62-
18 133.7 (b), (d), (e) and (f)), and therefore meet the definition of incremental costs
19 as defined in N.C. Gen. Stat. § 62-133.7(h)(1), to the extent the costs exceed the
20 Company’s avoided costs. As such, the Company proposes to recover the excess
21 of the Program costs above its approved levelized avoided costs through the
22 annual rider provided for in Commission Rule R8-67(e)(2). Annual Program
23 costs will be determined on a levelized basis, using a fixed charge rate applied to

1 the investment, and compared to levelized avoided cost to determine the annual
2 incremental costs. The Company's recovery of its incremental costs through this
3 annual rider is capped based on specified per account annual charges for each
4 customer class. The Company expects that the cost of this Program would
5 represent roughly 40% of the annual cost cap in 2010 and 2011, declining to
6 approximately 25% in 2012 and approximately 10% in 2015.

7 **Q: IS THE COMPANY REQUESTING A RATE CHANGE AT THIS TIME?**

8 A: No, the Company is not requesting a rate change at this time. Commission Rule
9 R8-67 allows the Company to request a change in rates to recover its prudently
10 incurred REPS compliance costs by requesting approval to charge an annual
11 increment or decrement as a rider to its rates. Such request is to be made in the
12 same time frame as the Company's proposed fuel rate changes under Rule R8-55.
13 The Company would expect to make its request to recover its incremental costs
14 of this Program in early 2009. Given the newness of Senate Bill 3 and its related
15 rules, however, the Company requests that the Commission affirm that its
16 proposed approach is acceptable before the Company moves forward with the
17 Program.

18 **Q: WHAT IS THE EXPECTED IMPACT ON A RESIDENTIAL**
19 **CUSTOMER'S MONTHLY BILL?**

20 A: The recovery of the Company's incremental costs of the Program (equal to the
21 levelized annual costs of the Program in excess of the Company's currently
22 approved levelized avoided costs) will result in a REPS rider increment to base
23 rates of approximately \$0.34 per month per residential customer account.

1 Because the Company will incur other costs to comply with the REPS, recovery
2 of the incremental costs of this Program will be only one component of the
3 Company's proposed REPS rider to recover all incremental costs of meeting the
4 REPS requirements, subject to the annual per-account cost caps set forth in N.C.
5 Gen. Stat. § 133.7 (h) (4). The Company expects to implement any proposed
6 REPS rider increment or decrement as a "flat rate" fee or credit due to problems
7 of insufficient cost recovery associated with a rate per kwh methodology. The
8 Company filed comments on this issue in Docket E-2, Sub 930 on July 8, 2008.
9 In its application in this Docket on June 6, 2008, the Company stated the impact
10 to residential customers in the form of a typical residential customer bill of 1,000
11 kwh, which is an historically common approach to expressing customer rate
12 impacts. The Company, however, seeks to correct and make clear by this
13 testimony that it plans to use the "flat rate" approach in order to achieve full
14 recovery of its incremental costs of compliance with the REPS requirements.

15 **Q: WHEN DOES THE COMPANY EXPECT TO MAKE ITS NEXT**
16 **AVOIDED COST FILING?**

17 A: The Company expects to update its avoided costs in the upcoming biennial
18 proceeding under Docket E-100, Sub 117.

19 **Q: DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

20 A: Yes.

21

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 856

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Application of Duke Energy Carolinas, LLC)	DIRECT TESTIMONY OF
For Approval of Solar Photovoltaic)	OWEN A. SMITH
Distributed Generation Program)	DUKE ENERGY CAROLINAS, LLC
And for Approval of Proposed Method of)	
Recovery of Associated Costs)	

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I. INTRODUCTION AND PURPOSE

Q: PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A: My name is Owen A. Smith, and my business address is 400 South Tryon Street, Charlotte, North Carolina.

Q: WHAT IS YOUR POSITION WITH DUKE ENERGY CORPORATION?

A: I am Director, Corporate Strategic Initiatives and Regulated Renewables Strategy for Duke Energy Corporation (“Duke Energy”).

Q: PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL AFFILIATIONS.

A: I am a graduate of East Carolina University with a Bachelor of Arts in Industrial/Organizational Psychology and a Minor in Business Administration. I also have a Master’s degree in Business Administration from Wake Forest University.

Q: PLEASE DESCRIBE YOUR BUSINESS BACKGROUND AND EXPERIENCE.

A: I joined Duke Energy Corporation in 2002 as a Commercial Associate. I have held positions in Corporate Strategy, Treasury, Mergers & Acquisitions, Market Research, and Renewable Energy Strategy. I assumed my current position in November 2007.

Q: WHAT ARE YOUR RESPONSIBILITIES IN YOUR CURRENT POSITION?

1 A: I have two primary sets of responsibilities. First, I am accountable for the
2 renewable energy strategy for Duke Energy’s regulated businesses, including
3 Duke Energy Carolinas, LLC (“Duke Energy Carolinas” or the “Company”) and
4 our utility operating companies in Indiana, Ohio, and Kentucky. This includes
5 pursuing renewable generation initiatives, customer programs, and compliance
6 with renewable energy requirements. Second, I have responsibilities with respect
7 to facilitating Duke Energy Corporation’s long-range strategic planning process.
8 I have held the responsibilities regarding corporate strategic planning since
9 October of 2006, and I assumed the renewables responsibilities in November of
10 2007 as an expansion of my role.

11 **Q: HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH**
12 **CAROLINA UTILITIES COMMISSION?**

13 A: No.

14 **Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

15 A. On June 6, 2008, Duke Energy Carolinas filed an Application for Approval of a
16 Solar Photovoltaic (“PV”) Distributed Generation Program and for Approval of
17 Proposed Method of Recovery of Associated Costs (the “Application”). The
18 purpose of my testimony is to provide a detailed description of Duke Energy
19 Carolinas’ proposed solar PV distributed generation program (the “Program”),
20 including the Program design, anticipated Program costs, and expected Program
21 benefits.

22 **II. PROGRAM DESIGN AND COMPONENTS**

23 **Q: PLEASE BRIEFLY DESCRIBE THE PROGRAM.**

1 A: Duke Energy Carolinas proposes to invest, over a two-year period, approximately
2 \$100 million to install, own and operate new solar PV distributed generation
3 facilities to produce energy to serve its customers. Specifically, the Program
4 involves installation of multiple solar PV generating facilities in the Company's
5 North Carolina service territory. The facilities are expected to have a total
6 combined capacity of approximately 20 megawatts direct current ("MWDC").
7 The generating facilities will be installed on both customer- and Company-owned
8 property in the Company's North Carolina service area. Each facility is expected
9 to have a useful life of approximately 20-25 years, and a capacity factor of 13 to
10 20 percent (based on the direct current ("DC") rated capacity of 20 MW), or 17 to
11 25 percent (based on the alternating current ("AC") rated capacity of 16-17 MW).
12 The specific capacity factor of each facility will depend largely on how it is
13 installed. For example, flat and fixed tilt roof mounts typically have lower
14 capacity factors than two-axis tracking systems that optimize production and are
15 typically ground mounted.

16 The Program will enable the Company to partially meet its obligations
17 under the recently established Renewable Energy and Energy Efficiency Portfolio
18 Standards ("REPS"), and the REPS set-aside for solar energy resources in
19 particular. The Program also will facilitate the Company's evaluation of the
20 impact of significant distributed generation on the Company's electric system. In
21 addition, the Program will allow the Company to explore the nature of solar
22 distributed generation offerings desired by customers, fill knowledge gaps to
23 enable successful, wide-scale deployment of solar PV distributed generation

1 technologies, and promote the commercialization of the solar market in North
2 Carolina through utility ownership. The Program will enable Duke Energy
3 Carolinas to serve more of its load with renewable resources and help offset the
4 use of other generation resources and potential power purchases.

5 **Q: WHY IS THE CAPACITY OF THE SOLAR PV GENERATION**
6 **FACILITIES MEASURED IN MEGAWATTS DIRECT CURRENT?**

7 A: Solar PV modules produce DC. The capacity output of the modules to be
8 installed under the Program, therefore, is measured and referred to in my
9 testimony and that of other Company witnesses in terms of DC capacity unless
10 specifically noted otherwise. This is consistent with solar industry practice. The
11 DC power produced by the modules must be converted to AC power with an
12 inverter in order to be used in the Company's distribution and transmission
13 systems. After conversion to AC power, the effective total installed capacity of
14 20 MWDC is expected to be 16 – 17 megawatt AC ("MWAC").

15 **Q: PLEASE DESCRIBE THE SOLAR PV TECHNOLOGY TO BE USED**
16 **UNDER THE PROGRAM.**

17 A: The scale of the Program allows for multiple types of installations in multiple
18 locations. Such an approach will enable the Company to thoroughly assess the
19 solar opportunities in North Carolina to determine the most cost-effective and
20 best-performing options for future deployments. There currently are several
21 competing technologies in the PV module market, including but not limited to
22 Crystalline Silicon, Concentrating Photovoltaic, and various forms of Thin Film
23 technologies. The Company plans to deploy several types of PV technologies in

1 order to compare cost, performance, and reliability data that it will use to distill
2 the true cost (\$/MWh) for each technology in its North Carolina service territory.
3 This data will enable the Company to select the best performing and/or least cost
4 options for future deployment of solar PV systems.

5 Additionally, different localities have diverse requirements for the
6 commissioning and installation of solar PV systems (e.g., engineering drawings,
7 permits, inspections, etc.). Through deployment of a substantial number of solar
8 PV distributed generation systems in the Company's North Carolina service
9 territory, the Company expects to identify, collect, and analyze varying local
10 requirements, which the Company hopes will yield benefits such as:

- 11 • Development of recommendations to simplify and standardize
12 requirements for PV system installation;
- 13 • Reduced administrative burden for utilities, local authorities, and
14 installers;
- 15 • Lower installed costs as installation efficiencies are gained; and
- 16 • Education and familiarization with solar PV facility installation for local
17 inspection authorities.

18 **Q: BRIEFLY DESCRIBE THE SOLAR PV INSTALLATIONS.**

19 **A:** Between 80-90% of the Program's installed capacity will consist of large scale
20 ground-mounted facilities and rooftop installations on large commercial or
21 industrial buildings, with individual facilities in this category ranging from 500
22 kW to 3 MW. Up to 10% of the Program's installed capacity will be medium
23 scale rooftop or ground-mounted facilities with individual facilities in this

1 category ranging in size from 15 kW to 500 kW. Structures that would fit into
2 this medium category include schools, office buildings, and multi-family
3 structures. Commercial or industrial structures that are not suitable for large scale
4 installations due to size or other factors may also be included in this medium
5 category. Small scale facilities on residential rooftops, ranging from 1.5 to 5 kW
6 in capacity will comprise the remainder of the Program up to 10% of the
7 Program's total capacity.

8 **Q: PLEASE LIST THE VARIOUS COMPONENTS OF THE SOLAR PV**
9 **GENERATION FACILITIES.**

10 A: Each solar PV generating facility will consist of the following basic components
11 which are necessary to produce electricity: (1) PV modules, (2) one or more
12 inverters, (3) AC and DC disconnects, (4) interconnection equipment, and (5)
13 racking and mounting equipment and electrical conduit.

14 **Q: PLEASE DESCRIBE THE FUNCTION OF A PV MODULE.**

15 A: PV modules consist of photovoltaic cells which convert sunlight into direct
16 current and are arranged and packaged to produce a desired voltage and current
17 appropriate for an inverter. The modules are typically connected in series in a
18 "string" to achieve the desired voltage. Two or more "strings" are then connected
19 in parallel to form an "array," which provides the desired voltage and current to
20 the inverter. The PV modules generate DC power, which must be converted to
21 AC power for use in the Company's distribution or transmission system.

22 **Q: PLEASE DESCRIBE THE FUNCTION OF AN INVERTER.**

1 A: The inverter is an electronic device that converts the DC power produced by the
2 solar array into AC power suitable for use on the transmission or distribution grid.
3 Inverters also typically contain an automatic disconnect function that serves to
4 isolate the PV facility from the grid in the event of a grid outage. This is a safety
5 feature that prevents the PV facility from back feeding energy into the grid during
6 outages when power lines may be down or utility personnel may be working to
7 restore electric service.

8 **Q: WHAT ARE AC AND DC DISCONNECTS?**

9 A: Disconnects provide a means of isolating the DC or AC power from other
10 components of the solar PV facility or the grid in order to conduct maintenance or
11 repair to the PV system, other interconnection facilities, or the grid.

12 **Q: WHAT IS THE PURPOSE OF INTERCONNECTION EQUIPMENT?**

13 A: Interconnection equipment, such as metering, transformers, circuit breakers,
14 fuses, and switches serve to connect the PV system to the electric grid and to
15 disconnect the PV system from the electric grid when required for maintenance or
16 repair.

17 **Q: DESCRIBE THE FUNCTION OF RACKING OR MOUNTING
18 EQUIPMENT AND ELECTRICAL CONDUIT AS THEY RELATE TO
19 THE GENERATING FACILITIES.**

20 A: Racking or mounting equipment and electrical conduit are used as necessary to
21 securely connect, align, and protect the PV modules, inverters, disconnects, and
22 interconnection wiring.

1 **Q: WILL THE SOLAR PV FACILITIES CONTAIN TECHNOLOGY THAT**
2 **MINIMIZES THE REFLECTION OF SOLAR RAYS?**

3 A: Yes. As a general rule, PV facilities are designed to minimize reflective glare, as
4 the principal purpose of solar PV panels is to absorb as much sunlight as possible.
5 This is generally accomplished through an anti-reflective coating on the PV
6 module. Concentrating PV (“CPV”) technology, however, is somewhat of an
7 exception to this generality. CPV technology utilizes mirrors or lenses to
8 concentrate sunlight onto a smaller solar PV cell. In applications where mirrors
9 are used, the mirrors intentionally reflect sunlight, and that sunlight is directed
10 with precision at a specific point in close proximity to the mirrors themselves.
11 CPV technology is most commonly used in ground-mounted applications. It is
12 the Company’s intention to utilize CPV technology in a small number of ground-
13 mounted projects if the Company receives credible and reasonably priced
14 proposals to do so. The majority of installed capacity under the Program will be
15 flat panel PV modules that will include the anti-reflective features described
16 above.

17 **Q: HOW DOES THE COMPANY PLAN TO INTEGRATE THE PROGRAM**
18 **INTO ITS EXISTING POWER GRID?**

19 A: Each PV facility that is installed under the Program will follow the Company’s
20 interconnection standards that are required for any distributed generators
21 connecting to the grid. System impact studies will be performed for PV
22 installations when deemed necessary to determine the appropriate level of
23 interconnection. These studies will determine if the installation is better served

1 by interconnecting to transmission or distribution facilities, and if additional
2 modifications are required. Factors used in determining the appropriate level of
3 interconnection will include the cost of interconnection, the impact of the PV
4 facility on the performance of the power grid, and the impact to customers.

5 **Q: HOW WOULD THE COMPANY DETERMINE WHERE FACILITIES**
6 **ARE INSTALLED UNDER THE PROGRAM?**

7 A: The Company will seek customers who own large warehouses, commercial and
8 industrial establishments, office buildings, single family homes, multi-family
9 structures (such as apartment or condominium buildings), subdivisions, schools,
10 or other property to participate in the Program. Upon approval of the Program,
11 customers who desire to offer their property as host sites for solar PV installations
12 can contact Duke Energy Carolinas directly to request inclusion in the Program.
13 Smith Exhibit 1 (a copy of which is Attachment A to the Company's Application)
14 represents a form of the tariff ("Solar Photovoltaic Distributed Generation
15 Program (NC)") setting forth the terms and conditions that the Company intends
16 to offer to customers with businesses, homes, and other property that may be
17 suitable for the installation of a solar PV facility. As described in the Program
18 Tariff, the Program will be available on a limited and voluntary basis, at the
19 Company's option, to customers in owner-occupied individually metered single-
20 family residences, or owners of other property, suitable for the installation of a
21 solar PV system. The Company will work with customers to determine whether a
22 solar PV generating facility is a viable option for their home, business, or land.
23 Factors that the Company will consider in making that determination include, but

1 are not limited to, the age of the roof in question, the angle and orientation of the
2 roof or the slope and orientation of the land, the presence of trees and other solar
3 obstructions, and whether the roof in question can support the weight of the solar
4 PV generating facility. To date, the Company has been contacted by more than
5 200 customers seeking to be host sites for the Program. Additionally, more than
6 30 solar PV entities (including installers, manufacturers, and other suppliers of
7 PV services or products) have contacted the Company to express their desire to be
8 selected for Program fulfillment.

9 The Company also will evaluate siting one or more facilities on Company-
10 owned property. In these cases, the Company will consider the same site
11 characteristics noted above, but the customer tariff would not apply.

12 **Q: DESCRIBE THE GENERAL PROVISIONS OF SMITH EXHIBIT 1, THE**
13 **TARIFF THAT WOULD GOVERN CUSTOMERS' PARTICIPATION IN**
14 **THE PROGRAM?**

15 **A:** The general provisions of the tariff are as follows:

- 16 • The Company will install a solar PV system on the owner's property under
17 a separate lease agreement with the owner;
- 18 • The maximum number of customers served under the Program will be the
19 number required to achieve approximately 20 MWDC of installed PV
20 capacity, of which up to 10% will be installed on single-family residences
21 and the remainder will be installed on nonresidential establishments,
22 multi-family structures, or other property;

- 1 • The maximum installed capacity of the PV systems will be 5 kW for
2 single family residences and 3000 kW for nonresidential establishments or
3 other property; and
- 4 • The Company reserves the right to limit the total installed PV capacity
5 and/or the number of customers served under this Program on the same
6 retail distribution circuit.

7 The terms of the agreement between the Company and each individual customer
8 will be set forth in the lease agreement.

9 **Q: ARE THERE ANY EXPECTED ENVIRONMENTAL IMPACTS OF THE**
10 **SOLAR PV FACILITIES?**

11 **A:** The environmental impacts of the Program are positive in nature. The
12 Company's generation of electricity from the solar PV facilities will not produce
13 any emissions such as NOx, SOx, Hg, particulates, or CO2. For example, the
14 clean energy that the Program is expected to deliver will help avoid at least
15 15,600 tons of CO2 emissions each year. Additionally, solar PV facilities are
16 quiet and, accordingly, noise pollution is not an issue.

17 **Q: PLEASE DESCRIBE HOW PRINCIPAL CONTRACTORS AND**
18 **SUPPLIERS FOR THE CONSTRUCTION OF THE SOLAR PV**
19 **FACILITIES WILL BE SELECTED.**

20 **A:** At this time, contractors and suppliers for the Program have not been selected.
21 The Company is preparing a request for proposals ("RFP") that will be initiated in
22 August 2008. This RFP will provide a competitive bidding process from which
23 the Company will be able to select the best proposals to fulfill the needs of the

1 Program. Through this RFP, the Company will seek to establish agreements with
2 reputable parties that have proven capabilities with respect to sourcing or
3 manufacturing the required PV components, installation, and maintenance
4 services. Ideally, the Company will establish agreements with a select number of
5 entities that can provide “turnkey” services that could include site assessments,
6 installation of PV systems, and maintenance agreements. The Company also will
7 consider arrangements where a particular party may offer to perform only some of
8 these functions.

9 **III. PROGRAM SCHEDULE AND COSTS**

10 **Q: WHAT ARE THE COMPANY’S ESTIMATES OF THE CONSTRUCTION**
11 **COSTS FOR THE SOLAR PV FACILITIES?**

12 **A:** As specified in the Application, the Company will spend an estimated \$100
13 million over a two-year period to construct approximately 20 MWDC of
14 distributed generation solar PV facilities.

15 **Q: WHAT IS THE PROJECTED COST OF EACH MAJOR COMPONENT**
16 **OF THE SOLAR PV FACILITIES?**

17 **A:** Based upon the Company’s review of research from public and private sources,
18 we estimate the current cost of each major component of a typical residential PV
19 facility is as follows:

20	PV Modules	\$4.75 / DC watt
21	Inverter	\$0.75 / DC watt
22	Balance of System (wiring, conduit, racking, etc.)	\$0.50 / DC watt
23	Labor	\$1.25 / DC watt

1 General & Administrative\$1.25 / DC watt
2 Total\$8.50 / DC watt

3 For larger system sizes, volume efficiencies are gained and lower \$ / watt
4 costs are achieved, particularly in the areas of General & Administrative (which is
5 primarily a fixed cost), Balance of System, and Labor, but also, to a lesser extent
6 in Modules and Inverters. For example, for installations of approximately 250kW
7 to 500kW, research indicates current total costs are approximately \$6.50 / watt.
8 For large systems (>1 MW), research indicates current total costs of
9 approximately \$5.00 / watt are being achieved.

10 The costs illustrated above are indicative of current pricing. Our research
11 indicates, and we expect, a downward trend in PV system component pricing
12 during the period of implementation of the Program. The RFP referenced earlier,
13 however, is the method by which the Company will obtain firm pricing
14 commitments from suppliers.

15 **Q: WHAT IS THE PROJECTED SCHEDULE FOR INCURRING THESE**
16 **COMPONENT AND FACILITY COSTS?**

17 **A:** The Company intends to incur the costs of the Program over a 2-year period
18 following approval from the Commission. For planning purposes, the Company
19 assumes that it will spend 40% (\$40 million) of the capital in 2009 and spend the
20 remaining 60% (\$60 million) in 2010. The Company projects that the installed
21 capacity would be proportionate with the dollars spent (i.e., approximately 8 MW
22 of capacity would be installed in 2009 and the remaining 12 MW would be
23 installed in 2010).

1 Q: WHAT ARE THE ANTICIPATED FUTURE OPERATING COSTS,
2 INCLUDING THE ANTICIPATED IN-SERVICE EXPENSES
3 ASSOCIATED WITH THE GENERATING FACILITIES FOR THE 12-
4 MONTH PERIOD OF TIME FOLLOWING COMMENCEMENT OF
5 COMMERCIAL OPERATIONS OF THE SOLAR PV FACILITIES?

6 A: The Company anticipates spending between \$700,000 and \$1.3 million annually
7 to operate and maintain the facilities and to compensate host sites for use of their
8 property.

9 IV. ELIGIBILITY OF THE PROGRAM FOR TAX BENEFITS

10 Q: WHAT TAX BENEFITS ARE AVAILABLE FOR THE PROGRAM?

11 A: The Company expects the Program to be eligible for certain State and Federal tax
12 benefits that collectively will reduce the Program's overall costs substantially.
13 One tax benefit comes from the North Carolina renewable energy investment tax
14 credit of 35% on the amount of the investment. A second tax benefit comes from
15 the Federal five-year accelerated tax depreciation benefit. These tax benefits are
16 substantial and already available to the Company today. Additionally, North
17 Carolina Senate Bill 1878 has passed both chambers and now awaits the
18 Governor's signature. It is the Company's understanding that the Governor
19 intends to sign this bill, which will modify a number of property tax provisions,
20 including an exclusion from property tax for 80% of the appraised value of an
21 installed solar electric system, which would further reduce the costs of the
22 Program. Another potential future tax benefit is a federal investment tax credit of
23 30%. This benefit is currently available to non-utilities and is due to decrease

1 from 30% to 10% at the end of 2008 unless extended by Congress. Proposed
2 legislation in Congress would extend the duration of this tax credit at the 30%
3 level and also make it available to utilities. This potential statutory change would
4 provide additional benefits to the Program.

5 **Q: PLEASE SUMMARIZE THE BENEFITS OF THE PROGRAM.**

6 **A:** There are many benefits of this program and they include the following:

- 7 • The Program will result in the production of renewable energy that will
8 help enable Duke Energy Carolinas to comply with its REPS obligations
9 and, along with the power to be purchased from Sun Edison pursuant to a
10 recent purchase power agreement, will specifically help the Company
11 meet its obligations under the solar carve out of the REPS for the next few
12 years.
- 13 • The Program will enable the Company to understand the impact of
14 distributed generation on its system. The Company believes that solar PV
15 distributed generation will become much more prevalent in the future, and
16 this Program will enable the Company to better understand any concerns
17 and opportunities that can arise with the introduction of distributed
18 generation.
- 19 • The Program will enable the Company to develop and enhance
20 competencies as owners and operators of renewable generation facilities.
21 This competency will benefit customers because the Company will
22 become capable of building and owning renewable resources rather than
23 relying solely on power purchase agreements. In cases where there may

1 be no viable or attractively priced power purchase options available to the
2 Company, this competency will be especially beneficial.

- 3 • The distributed nature of this program promotes energy security.
- 4 • The electricity produced under this Program is emission free.
- 5 • The Program will promote economic development in North Carolina by
6 attracting investment and creating jobs in the growing solar industry.
- 7 • The Program can drive down the cost of solar PV installations in North
8 Carolina through standardizing inspection requirements and leveraging
9 volume purchases.
- 10 • The Program enables the Company's customers to directly participate in
11 the development of renewable resources in North Carolina.

12 **V. APPROVALS**

13 **Q: WHY IS THE COMPANY REQUESTING A BLANKET CERTIFICATE**
14 **OF PUBLIC CONVENIENCE AND NECESSITY ("CPCN") AS OPPOSED**
15 **TO A CPCN FOR EACH SOLAR PV FACILITY?**

16 **A:** The Company requests a blanket CPCN in this Application because the precise
17 location of the facilities cannot be specified at this time and waiting to determine
18 such locations before filing multiple applications for individual CPCNs would
19 unduly delay and raise the costs of the Program. In short, the Company believes
20 that approval of a "blanket" CPCN will ensure that the Program is implemented
21 efficiently and without delay. It also will ensure that the benefits of the Program
22 are realized in a timely fashion.

1 Q: OTHER THAN APPROVAL FROM THIS COMMISSION, ARE THERE
2 OTHER APPROVALS REQUIRED BEFORE THE PROGRAM MAY BE
3 IMPLEMENTED?

4 A: Each PV installation will be subject to various permitting and inspection
5 requirements. These requirements vary at the local level based on location. The
6 Company will comply with all such requirements for all PV installations.

7 VI. REPS COMPLIANCE FILINGS

8 Q: DOES THE COMPANY INTEND TO INCLUDE THE ELECTRICITY TO
9 BE PRODUCED UNDER THE PROGRAM IN ITS REPS COMPLIANCE
10 PLAN WHEN IT SUBMITS ITS PLAN ANNUALLY TO THE
11 COMMISSION?

12 A: Yes.

13 Q: WILL THE COMPANY REGISTER FACILITIES CONSTRUCTED
14 UNDER THE PROGRAM AS REQUIRED BY COMMISSION RULE R8-
15 66?

16 A: Yes.

17 Q: DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

18 A: Yes.

SMITH EXHIBIT 1

Duke Energy Carolinas, LLC

North Carolina Original (Proposed) Leaf No. 150

SOLAR PHOTOVOLTAIC DISTRIBUTED GENERATION PROGRAM (NC)

AVAILABILITY (North Carolina Only)

This program is available on a limited and voluntary basis, at the Company's option, to customers in owner-occupied individually metered single-family residences, or owners of other property, suitable for the installation of a solar photovoltaic (PV) system.

GENERAL PROVISIONS

- The Company will install a PV system on the owner's property, under a separate lease agreement with the owner.
- The maximum number of customers served under this program will be the number required to achieve 20,000 kW (DC) of installed PV capacity, of which up to 10% will be installed on single-family residences and the remainder will be installed on nonresidential establishments or other property.
- The maximum installed capacity of the PV system will be 5 kW for residences and 3000 kW for nonresidential establishments or other property.
- The Company reserves the right to limit the number of customers served under this program on the same retail distribution circuit.

CONTRACT

The terms of the agreement will be set forth in the lease agreement with the customer.

North Carolina Original (Proposed) Leaf No. 150
Effective
NCUC Docket No. E-7, Sub

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 856

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)	
Application of Duke Energy Carolinas, LLC)	DIRECT TESTIMONY OF
For Approval of Solar Photovoltaic)	ELLEN T. RUFF
Distributed Generation Program)	DUKE ENERGY CAROLINAS, LLC
And for Approval of Proposed Method of)	
Recovery of Associated Costs)	

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I. INTRODUCTION AND PURPOSE

Q: PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A: My name is Ellen T. Ruff, and my business address is 526 South Church Street, Charlotte, North Carolina.

Q: WHAT IS YOUR POSITION WITH DUKE ENERGY CAROLINAS, LLC?

A: I am President of Duke Energy Carolinas, LLC (“Duke Energy Carolinas” or the “Company”). Duke Energy Carolinas is a wholly-owned subsidiary of Duke Energy Corporation (“Duke Energy”).

Q: PLEASE BRIEFLY SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL AFFILIATIONS.

A: I am a graduate of Simmons College with a Bachelor of Arts in Business. I also have a Juris Doctor degree from the University of North Carolina at Chapel Hill, and have completed the Harvard Business School’s Advanced Management Program. I am a member of the North Carolina State Bar, the Mecklenburg County Bar, and the American Bar Association. I serve on the Board of Directors of Aqua America, Inc., the Board of Directors and Executive Committee of the North Carolina Chamber, and the North Carolina Economic Development Board. I also serve on the regional Board of Directors of United Way, and am serving as Chair of the United Way Regional Campaign for 2008.

Q: PLEASE DESCRIBE YOUR BUSINESS BACKGROUND AND EXPERIENCE.

1 A: I joined Duke Power Company (now known as Duke Energy Carolinas) in 1978
2 as an attorney in the Legal Department. I was named Vice President and General
3 Counsel of Electric Operations following the creation of the Duke Energy
4 Corporation in 1997. I was named Vice President and General Counsel of
5 Corporate, Gas and Electric Operations in January 1999, and Senior Vice
6 President and General Counsel in February 2001. I was appointed Senior Vice
7 President of Asset Management for Duke Power, a division of Duke Energy
8 Corporation, in August 2001. I became Senior Vice President of Power Policy
9 and Planning in February 2003, and Group Vice President of Power Policy and
10 Planning in March 2004. I became Group Vice President of Planning and
11 External Relations for Duke Power in March 2005. I assumed my current
12 position in April 2006.

13 **Q: WHAT ARE YOUR RESPONSIBILITIES IN YOUR CURRENT**
14 **POSITION?**

15 A: I lead Duke Energy Carolinas' regulated electric utility business in North Carolina
16 and South Carolina, which serves more than 2.3 million customers.

17 **Q: HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH**
18 **CAROLINA UTILITIES COMMISSION?**

19 A: Yes, I have testified before this Commission on numerous occasions. I most
20 recently presented testimony in support of Duke Energy Carolinas' Energy
21 Efficiency Plan, Docket No. E-7, Sub 831.

22 **Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

1 A. On June 6, 2008, Duke Energy Carolinas filed an Application for Approval of a
2 Solar Photovoltaic (“PV”) Distributed Generation Program and for Approval of
3 Proposed Method of Recovery of Associated Costs (the “Application”). The
4 purpose of my testimony is to discuss the importance of the requested approval
5 and to outline some of the benefits of Duke Energy Carolinas’ proposed solar PV
6 distributed generation program (the “Program”). In addition to my testimony,
7 Witness Smith provides a detailed discussion of the Program design and Program
8 costs. Witness Hager describes how the proposed construction of solar generation
9 facilities under the Program conforms to the utility’s most recent annual plan.
10 Witness McManeus explains the cost recovery proposal for the Program as well
11 as the potential rate impacts of the Program.

12 II. PROGRAM DESCRIPTION AND RATIONALE

13 **Q: PLEASE BRIEFLY DESCRIBE THE PROGRAM.**

14 A: The Company proposes to invest \$100 million over two years to install numerous
15 solar PV facilities throughout its service territory to generate electric energy to
16 serve its customers. We anticipate that the total generating capacity of these
17 facilities would be 20 megawatts direct current (MWDC). When operating at
18 peak capacity, the facilities installed under the Program will generate enough
19 electricity to power approximately 2600 homes in the Carolinas.

20 **Q: WHY IS DUKE ENERGY CAROLINAS PURSUING THE PROGRAM?**

21 A: The Company is pursuing this program primarily to comply with the Renewable
22 Energy and Energy Efficiency Portfolio Standard (“REPS”) established by the
23 North Carolina General Assembly in 2007 as part of Senate Bill 3. The REPS is a

1 set of standards specifying that electric public utilities in North Carolina must
2 supply their retail customers with a certain amount of electricity from renewable
3 sources or reduce consumption of electricity through energy efficiency measures
4 by a certain date. The Company anticipates increasing its reliance on renewable
5 energy generation resources to serve its customers over time. Accordingly, the
6 Company is committed to supporting the development of solar PV technology
7 into a flourishing and self-sustaining industry that can complement more
8 conventional technologies to supply the electricity needs of the Company's
9 customers. The Program also will enable Duke Energy Carolinas to evaluate the
10 impact of distributed generation of a significant scale on the Company's electric
11 system.

12 III. REPS COMPLIANCE

13 Q: **DOES SENATE BILL 3 SPECIFY A SCHEDULE FOR COMPLYING**
14 **WITH THE REPS REQUIREMENTS?**

15 A: Yes it does. Under Senate Bill 3, each electric public utility in the State must
16 comply with the REPS requirement according to the following schedule:

<u>Calendar Year</u>	<u>REPS Requirement</u>
2012	3% of 2011 N.C. retail sales
2015	6% of 2014 N.C. retail sales
2018	10% of 2017 N.C. retail sales
2021 and thereafter	12.5% of 2020 N.C. retail sales

22 Q: **DOES THE REPS INCLUDE "SET ASIDES" FOR ANY PARTICULAR**
23 **RENEWABLE RESOURCES?**

1 A: Yes, the REPS includes “set asides” or “carve outs” for solar energy, swine waste
2 and poultry waste resources. With respect to solar, it provides that beginning with
3 the year 2010, each electric public utility must satisfy its REPS requirement in
4 part with a combination of new solar electric facilities and new metered solar
5 thermal energy facilities that use one or more of certain specified applications.
6 This requirement is sometimes referred to as the “Solar Set Aside” or the “Solar
7 Carve Out”. The Solar Carve Out requires compliance according to the following
8 schedule:

9	<u>Calendar Year</u>	<u>Requirement for Solar Resources</u>
10	2010	0.02% N.C. retail sales
11	2012	0.07% N.C. retail sales
12	2015	0.14% N.C. retail sales
13	2018	0.20% N.C. retail sales

14 **Q: HOW MAY A UTILITY COMPLY WITH THE REPS REQUIREMENTS?**

15 A: Subject to certain limitations, an electric public utility may meet the REPS
16 requirements by doing one or more of the following: (1) generating electric power
17 at a new renewable energy facility; (2) using a renewable energy resource to
18 generate electric power at a generating facility (other than the generation of
19 electric power from waste heat derived from the combustion of fossil fuel); (3)
20 implementing energy efficiency measures to reduce electricity consumption; (4)
21 purchasing electric power from a new renewable energy facility; and (5)
22 purchasing renewable energy certificates derived from new renewable energy
23 facilities. Additionally, Senate Bill 3 allows a utility to carry forward renewable

1 energy generated in one year that exceeds the compliance requirements of that
2 year into a future year.

3 **Q: DOES THE COMPANY'S PROGRAM COMPLY WITH THE REPS**
4 **REQUIREMENTS IN GENERAL AND THE SOLAR CARVE OUT**
5 **PROVISIONS IN PARTICULAR?**

6 A: Yes, the Program complies with the REPS requirements as well as the solar carve
7 out provisions. The solar PV facilities the Company proposes to install under the
8 Program are "renewable energy facilities" as defined by Senate Bill 3 and,
9 therefore, may be used to comply with the REPS requirements. Thus, the
10 Program will enable Duke Energy Carolinas to partially fulfill its REPS
11 obligations in general and the Solar Carve Out in particular. As Company witness
12 Smith explains, the Company intends to include the Program in its REPS
13 compliance plan when such plan is filed with the Commission annually pursuant
14 to Commission Rule R8-67. The Company also will register facilities constructed
15 under the Program as required by Commission Rule R8-66.

16 **IV. PROGRAM BENEFITS**

17 **Q: WHAT ARE SOME OF THE BENEFITS OF THE PROGRAM?**

18 A: In addition to helping the Company meet its REPS obligations, overall, the
19 Program will promote the development of renewable energy in the State of North
20 Carolina. As Witness Smith explains, the Company proposes to invest \$100
21 million to install several hundred facilities around the Company's North Carolina
22 service territory with a generating capacity totaling approximately 20 MWDC.
23 Despite the significant federal and state tax incentives available for investments in

1 solar resources, there were, as of June 6, 2008 (the date of the Company's initial
2 application in this docket), only approximately 60 customer-installed solar
3 generation facilities in the Company's territory with a total installed capacity of
4 approximately 300 kilowatts. We believe that by getting involved on such a large
5 scale, the Company can help promote the development of solar generation
6 resources in North Carolina. Also, as explained in Ms. Hager's testimony, the
7 Program will, in a modest way, help diversify the resources the Company uses to
8 reliably meet the energy needs of its customers. Importantly, the development of
9 renewable resources and the diversification of energy supply resources are among
10 the specific goals enumerated by the General Assembly in enacting Senate Bill 3.

11 **Q: WILL THE PROGRAM BENEFIT CUSTOMERS IN OTHER WAYS?**

12 A: Yes. As Witness Smith explains, the generating facilities will be installed on both
13 customer and Company-owned property in the Company's North Carolina service
14 area. The distributed nature of the generation of electricity under the Program
15 will enable the Company to develop competency as an owner of solar renewable
16 assets, leverage volume purchases, build relationships with PV developers,
17 manufacturers, and installers, and gain invaluable experience with the installation
18 and operation of multiple types of solar distributed generation facilities.
19 Developing competencies in these areas mean that ultimately, the Company will
20 not be dependent solely on power purchases to meet the requirements of the Solar
21 Carve Out.

22 **Q: WHY DOES THE COMPANY BELIEVE THAT THIS APPLICATION IS**
23 **JUSTIFIED BY THE PUBLIC CONVENIENCE AND NECESSITY?**

1 A: Duke Energy Carolinas believes that its decision to invest in the Program is
2 justified by the public convenience and necessity for all the reasons provided in
3 my testimony and that of the other Company witnesses. In short, implementation
4 of the Program is prudent and the Company's Program is designed to serve the
5 public interest. It will enable the Company to meet its obligations under the
6 REPS, serve the electricity needs of its customers, and diversify its generation
7 resource mix as well as that of the State in general. It also will encourage
8 economic development, private investment in renewable energy, and improve the
9 air quality, among other benefits.

10 **Q: DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

11 A: Yes.

CERTIFICATE OF SERVICE

I certify that a copy of Duke Energy Carolinas, LLC's Direct Testimonies of Janice D. Hager, Jane L. McManeus, Owen A. Smith and Ellen T. Ruff in Docket No. E-7, Sub 856, has been served by electronic mail (e-mail), hand delivery or by depositing a copy in the United States Mail, first class postage prepaid, properly addressed to parties of record.

This the 25th day of July, 2008.

Robert W. Kaylor

Robert W. Kaylor

Law Office of Robert W. Kaylor, P.A.

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