

**BEFORE THE NORTH CAROLINA UTILITIES COMMISSION  
DOCKET NO. E-100, SUB 158**

**In the Matter of:** )  
**Biennial Determination of Avoided** )  
**Cost Rates for Electric Utility** )  
**Purchases from Qualifying Facilities** )  
**- 2018** )

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**DIRECT TESTIMONY OF  
CARSON HARKRADER  
ON BEHALF OF  
NORTH CAROLINA SUSTAINABLE ENERGY ASSOCIATION**

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1    **Q.    PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2    A.    My name is Carson Harkrader. My business address is 400 West Main Street  
3        Suite 503, Durham, North Carolina, 27701.

4    **Q.    BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5    A.    I am the Chief Executive Officer for Carolina Solar Energy III, LLC (which I  
6        will refer to as “CSE”). CSE was founded by my father, Richard Harkrader,  
7        to develop utility scale photovoltaic solar energy projects in North Carolina.  
8        From 2004 until the end of 2012, CSE provided design, financing,  
9        construction and operation management to a diverse customer base of  
10       commercial, nonprofit, utility, and government clients. Beginning in 2012,  
11       CSE modified our business model to provide project development services to  
12       local, national, and international solar companies. CSE is a business member  
13       of the North Carolina Sustainable Energy Association (“NCSEA”), on behalf  
14       of which I am providing this testimony.

15                CSE has successfully developed approximately 482 megawatts  
16        (“MW”) direct current (“dc”) of solar generating facilities, made up of 42  
17        projects that are currently in operation in North Carolina. The first project our  
18        company built was at PNC Arena, on the North Carolina State University  
19        campus here in Raleigh. At 75 kilowatts (“kW”), at the time it was turned on  
20        in January 2008, this was the largest privately-owned grid-tied utility scale  
21        solar project in the Southeast. Other early CSE projects include installations  
22        at the North Carolina Zoo, on the roof at the City of Raleigh’s E.M. Johnson

1 Water Treatment Plant, and at the entrance to the Person County Industrial  
2 Park located on U.S. Highway 501, where we often have sheep that graze  
3 around the solar panels. In 2012, we started developing 5 MW alternating  
4 current (“ac”) sized Public Utility Regulatory Policies Act (“PURPA”)   
5 qualifying facility (“QF”) solar projects, and in 2014 we began developing  
6 larger 50 MWac sized transmission interconnected QF solar projects, four of  
7 which are now delivering electricity to the Duke Energy Progress transmission  
8 system.

9 Since the passage of House Bill 589 (“H.B. 589”)<sup>1</sup> my company has  
10 stopped developing new QF projects in North Carolina. As I stated in my prior  
11 avoided cost testimony<sup>2</sup>, the shorter contracting periods now available to QFs  
12 in North Carolina are not financeable, and I do not know of any solar  
13 developers who are still active in developing new QFs for selling energy and  
14 capacity pursuant to PURPA power purchase agreements (“PPAs”). In North  
15 Carolina, I am responsible for managing a small group of grandfathered 5  
16 MWac QF projects which have been waiting since 2015 and 2016 for their  
17 interconnection studies from Duke, and we are also working on one or two  
18 projects for CPRE. We have mostly turned our business towards the PJM  
19 Interconnection LLC (“PJM”) market, which allows solar developers to  
20 contract and negotiate directly with large customers who wish to purchase  
21 renewable energy to lower their costs and meet their clean energy mandates.

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<sup>1</sup> Session Law 2017-192.

<sup>2</sup> *Direct Testimony of Carson Harkrader*, Docket No. E-100, Sub 148 (March 28, 2017), pp. 16-17.

1   **Q.   PLEASE DISCUSS YOUR EDUCATIONAL AND PROFESSIONAL**  
2       **BACKGROUND.**

3   A.   I earned a Bachelor of Arts with Honors in Political Science from Brown  
4       University, and wrote my honors thesis in 1999 on the deregulation of the  
5       electric utilities in Rhode Island. I also earned a master's in business  
6       administration degree in Finance and Strategy from New York University.  
7       Prior to business school, I was employed for eight years on the commercial  
8       sales team with GE Energy in Asia and New York. While at GE Energy, I led  
9       teams to sell wind and gas turbines in the United States, Canada, and Asia and  
10      was the lead negotiator on sales contracts for hundreds of megawatts of wind  
11      and gas turbine technology, managing the input of GE's engineering,  
12      sourcing, legal, and finance teams in the contract negotiation process. Prior to  
13      working for GE Energy, I spent two years at a renewable energy development  
14      company in Sydney, Australia, which developed biomass and wind energy  
15      projects and completed an initial public offering and listed on the Australian  
16      Stock Exchange in 2002. After completing business school, I returned home  
17      to North Carolina in 2012 to work with my father at CSE. At this point in  
18      time, I have a total of 17 years' experience in the energy industry and am  
19      familiar with solar, wind, conventional gas turbine and steam turbine  
20      technologies, and project development.

21               I have been the Chief Executive Officer at CSE since April 2018. In  
22      this role, I oversee the company's solar development process, determine our

1 geographic and market strategy, and manage our financial relationships. Prior  
2 to this role, I spent more than five years as the Director of Project  
3 Development for CSE. As Director of Project Development, I was  
4 individually responsible for the development of seven 5 MWac and two 50  
5 MWac qualifying facilities that are now in operation in North Carolina.  
6 Additionally, I was responsible for working with Duke Energy Progress to  
7 secure interconnection agreements and power purchase agreements for all of  
8 CSE's four 50 MWac qualifying facilities that are now in operation in North  
9 Carolina.

10 CSE is an early stage developer, meaning that we complete the land  
11 acquisition process, local and state permitting, and environmental permitting  
12 along with certification at the North Carolina Utilities Commission (the  
13 "Commission") and at the FERC. We also initiate the interconnection process  
14 with the relevant utility. In my roles at CSE, I have worked with other  
15 companies who partner with us to complete the financing and the construction  
16 of the solar farms. These relationships provide us with constant, ongoing  
17 feedback on the terms and conditions that are necessary for a project to secure  
18 financing and, ultimately, to be constructed.

19 In my years of working at CSE and developing solar facilities in North  
20 Carolina, I have had the opportunity to work closely with employees of Duke  
21 Energy Carolinas ("DEC"), Duke Energy Progress ("DEP") (collectively,  
22 "Duke") and the Virginia Electric and Power Company d/b/a Dominion

1 Energy North Carolina (“Dominion”) (Duke and Dominion collectively, the  
2 “Utilities”). It is my experience that the utility employees with whom I have  
3 worked have been very dedicated to their work and, in my opinion, have  
4 played a significant role in the success of the solar industry in North Carolina.  
5 CSE and NCSEA, as well as myself, are very appreciative of these efforts and  
6 we look forward to continuing to work together.

7 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH**  
8 **CAROLINA UTILITIES COMMISSION?**

9 A. Yes. I previously testified on behalf of NCSEA in the 2016 Avoided Cost  
10 proceeding, Docket E-100, Sub 148.

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

12 A. The purpose of my testimony is (i) to respond to several of the proposals made  
13 by the Utilities related to the implementation of the PURPA and related  
14 Qualified Facility projects, (ii) to provide the Commission with my  
15 observations, based on my experience, as to how the avoided cost must be  
16 accurately determined and implemented if the Commission’s objective is to  
17 successfully fulfill the mandates set forth in H.B. 589 while managing risk and  
18 value to ratepayers associated with solar and renewable grid integration, (iii)  
19 to discuss the implications of the changes proposed by the Utilities to the  
20 continued development of solar energy in North Carolina, and (iv) to bring  
21 into these discussions the demands of many NC utility customers who are

1 increasingly calling on our Utilities and regulators to quickly provide them  
2 with large amounts of new clean, low carbon energy.

3 **Q. PLEASE IDENTIFY THE SPECIFIC ISSUES TO WHICH YOU ARE**  
4 **RESPONDING.**

5 A. Pursuant to the Commission’s April 24, 2019 *Order Scheduling Evidentiary*  
6 *Hearing and Establishing Procedural Schedule*, I am offering testimony on  
7 the following issues:

- 8 • Duke’s IRP Assumptions Regarding Expiring Wholesale  
9 Contracts;
- 10 • Duke’s Quantification of Ancillary Services Cost of  
11 Integrating QF Solar;
- 12 • Duke’s Proposed Solar Integration Charge “Average Cost”  
13 Rate Design and Biennial Update;
- 14 • Dominion’s Proposed Re-Dispatch Charge; and,
- 15 • NCSEA and Public Staff’s Proposals Related to Differing  
16 Ancillary Services Costs for Innovative QFs.<sup>3</sup>

17 I also address the May 21, 2019 *Stipulation of Partial Settlement Regarding*  
18 *Solar Integration Services Charge* (herein the “Solar Integration Charge  
19 Stipulation”) entered into between the North Carolina Utilities Commission –  
20 Public Staff (“Public Staff”) and Duke.

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<sup>3</sup> *Order Scheduling Evidentiary Hearing and Establishing Procedural Schedule*, pp. 5-6, Docket No. E-100, Sub 158 (April, 24, 2019); *See also*, *Solar Integration Charge Stipulation*, pp. 4-11.

1   **Q.   PLEASE SUMMARIZE YOUR RESPONSE TO THE ABOVE-LISTED**  
2   **ISSUES.**

3   A.   In 2017, the North Carolina General Assembly enacted H.B. 589, a major  
4   piece of comprehensive energy legislation. H.B. 589 provided certain  
5   parameters beyond the scope of PURPA to allow and encourage private  
6   companies like mine to continue to bring new renewable energy projects into  
7   North Carolina’s generation mix, including solar generation. Two important  
8   initiatives outlined in H.B. 589 are the Competitive Procurement of  
9   Renewable Energy Program<sup>4</sup> (“CPRE”) and Green Source Advantage<sup>5</sup>  
10   (“GSA”) programs. These programs are designed by H.B. 589 to bring  
11   multiple gigawatts of new renewable energy onto North Carolina’s grid, and  
12   both of these programs refer to and rely on this avoided cost proceeding. I am  
13   personally concerned that Duke’s avoided cost proposal incorporates several  
14   ideas and methodologies which will curtail the ability of the CPRE and GSA  
15   programs to meet the goals of H.B. 589, and will lead to far less new  
16   renewable energy being contracted than was intended by H.B. 589.

17           Specifically, the solar integration charge proposed by Duke and, we  
18   feel regretfully, supported by the Public Staff via the Solar Integration Charge  
19   Stipulation, will remove necessary business certainties for non-utility solar  
20   developers to finance and build new systems, and may lead to the failure of  
21   existing operating QFs. Relatedly, Duke’s analysis and decision-making with

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<sup>4</sup> Codified at N.C. Gen. Stat. § 62-110.8.

<sup>5</sup> Codified at N.C. Gen. Stat. § 62-159.2.

1 regard to expiring PPAs to purchase energy and capacity from QFs is  
2 unreasonable, contradictory to H.B. 589, and could help to create an energy  
3 marketplace in North Carolina bereft of non-utility solar developers and non-  
4 utility owned solar facilities. Duke and the Public Staff agreed to the Solar  
5 Integration Charge Stipulation despite the fact that a similar two-year  
6 “refresh” was rejected by the Commission in the Docket No. E-100, Sub 148  
7 Avoided Cost proceeding.<sup>6</sup> Finally, the Solar Integration Charge Stipulation  
8 is based upon a study that ignores ancillary benefits that solar QFs can provide  
9 to ease intermittency issues, and this faulty analysis should not be the basis  
10 for incorporating a new charge on QFs.

11           Regarding the CPRE, this avoided cost proceeding will set the ceiling  
12 for costs in the upcoming second tranche of the CPRE. The CPRE is a rigorous  
13 and competitive process designed to identify the least-cost renewable energy  
14 resources available to satisfy the growth in renewable energy mandated by  
15 H.B. 589 for North Carolina. A too-low avoided cost rate, if approved by this  
16 Commission in this proceeding, would mean that not enough viable projects  
17 will be priced low enough to be able to be selected in the CPRE, leading to  
18 the failure of the CPRE to meet its legislative mandate. I would strongly  
19 advocate for the Commission to consider all of these interrelated issues when  
20 considering whether to further implement the policy changes requested by the  
21 Utilities in this proceeding.

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<sup>6</sup> *Order Establishing Rates and Contract Terms for Qualifying Facilities*, p. 69, Docket No. E-100, Sub 148 (October 11, 2017).

1   **Q.    WHAT IS YOUR OPINION OF DUKE’S INTEGRATED RESOURCE**  
2       **PLAN ASSUMPTIONS REGARDING EXPIRING WHOLESALE**  
3       **CONTRACTS?**

4    A.    Solar QFs which are in the midst of their PPA terms should be afforded the  
5        opportunity to continue to provide, and be compensated for, energy and  
6        capacity once their PPAs expire. Solar QFs have 30-40 or more year useful  
7        lives that exceed the length of their initial PPA terms and they should not be  
8        stranded prior to end of their useful life. Non-utility solar developers and our  
9        investors have paid hundreds of millions of dollars in interconnection  
10       payments to the Utilities, which were financed based on the assumption of a  
11       long-term operational period for QFs. I believe these assets should be  
12       provided reasonable avoided cost offtake contracts at the end of their initial  
13       PPA term, which will allow them to continue to operate and bring affordable,  
14       renewable energy to North Carolina ratepayers. Our industry is very  
15       concerned about the impact of this and future avoided cost proceedings on our  
16       operating assets.

17               Solar project owners are being squeezed in a number of ways due to  
18       the Utilities’ actions or inactions: (i) via the proposed Solar Integration Charge  
19       and other unique charges; (ii) denying accurate capacity payments as set forth  
20       more explicitly in NCSEA’s earlier filed comments in this proceeding; (iii)  
21       the advantages that the Utilities have in their ownership of solar projects; (iv)

1 and, as noted herein and in NCSEA’s other filings – the prohibitory nature  
2 that Duke has taken with regard to the addition of energy storage to solar QFs.

3 **Q. HOW DO YOU RESPOND TO DUKE’S ARGUMENT THAT SOLAR**  
4 **GENERATION IS NOT FIRM, AND THAT GENERATION**  
5 **VOLATILITY IS COSTLY TO RATEPAYERS?**

6 A. As I will discuss in more detail, the “firm” power argument ignores the  
7 benefits of distributed generation and also the burgeoning ancillary services  
8 market for solar QFs. The current level of solar generation represents  
9 approximately 5%<sup>7</sup> of the electricity sold in North Carolina. Many other  
10 utilities and RTOs across the country are integrating or are actively planning  
11 to integrate significantly more solar and distributed renewable energy as a  
12 percentage of generation, and our Governor has given us a clear mandate  
13 through Executive Order 80<sup>8</sup>: the generation mix in North Carolina needs to  
14 move towards renewable resources. Customers are demanding large amounts  
15 of new clean energy, and our utilities must adapt to managing a grid where  
16 distributed energy resources make up an increasing percentage of generation  
17 assets. To that end, I believe that the Commission should respond to customer  
18 demand and facilitate the addition of large amounts of clean energy and

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<sup>7</sup> Per the 2018 numbers calculated by the U.S. Energy Information Administration, available here: <https://www.eia.gov/electricity/data/browser/#/topic/0?agg=2.0.1&fuel=g004&geo=00000004&sec=g&linechart=ELEC.GEN.ALL-NC-99.A~ELEC.GEN.TSN-NC-99.A&columnchart=ELEC.GEN.ALL-NC-99.A&map=ELEC.GEN.ALL-NC-99.A&freq=A&start=2001&end=2018&ctype=linechart&ltype=pin&rtype=s&pin=&rse=0&maptype=0>

<sup>8</sup> Exec. Order No. 80 (2018), available at <https://files.nc.gov/governor/documents/files/EO80-%20NC%27s%20Commitment%20to%20Address%20Climate%20Change%20%26%20Transition%20to%20a%20Clean%20Energy%20Economy.pdf>.

1 innovation by renewable resources rather than penalizing the deployment of  
2 solar. Operating solar QFs should be given the opportunity to provide power  
3 to the grid through the balance of their useful life, and QF developers should  
4 be permitted to upgrade their facilities to a reasonable extent in order to  
5 provide ratepayers with the most affordable, cleanest, and best sources of  
6 energy. The solar industry in North Carolina would welcome the opportunity  
7 to work collaboratively with the Commission and the Utilities to build an  
8 ancillary services market that would allow distributed solar generation to  
9 provide electricity and ancillary services in a way that would be the most  
10 beneficial to the grid and to ratepayers.

11 **Q. DO YOU AGREE WITH DUKE WITNESS SNIDER’S ASSERTION**  
12 **THAT “THE COSTS AVOIDED BY GROWING LEVELS OF SOLAR**  
13 **QFS THAT PROVIDE INTERMITTENT, NON-DISPATCHABLE**  
14 **POWER IS MARKEDLY DIFFERENT FROM INTEGRATING FIRM**  
15 **POWER”<sup>9</sup>?**

16 A. No. Utilities and Commissions in other states such as Hawaii, New York,  
17 Maryland, and Nevada are actively searching for ways to integrate much  
18 higher levels of renewable energy than we are contemplating in North  
19 Carolina, and in the time since our last avoided cost proceeding here in North  
20 Carolina, many utilities across the country have determined that new  
21 renewable energy projects are more cost effective and beneficial to ratepayers

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<sup>9</sup> *Direct Testimony of Glen A. Snider on Behalf of Duke Energy Carolinas, LLC and Duke Energy Progress, LLC*, p. 34, Docket No. E-100, Sub 158 (May 21, 2019) (“Snider Direct”).

1 than existing or planned conventional generation and especially peaking  
2 generation projects. While our industry understands that integrating  
3 increasing levels of distributed renewable energy onto the grid creates change,  
4 I believe that Duke Witness Glen A. Snider (“Witness Snider”) failed to  
5 appropriately examine all costs and benefits from solar QFs. By focusing only  
6 on potential costs and not considering benefits, Duke is not taking steps in the  
7 right direction to plan for how to meet North Carolina customer’s demand for  
8 large amounts of new additional clean, low carbon energy.

9 **Q. HOW WOULD YOU CHARACTERIZE THE COSTS AND BENEFITS**  
10 **PROVIDED BY SOLAR QFS?**

11 A. First, it is important to note that currently, solar QFs have no financial  
12 incentive to minimize the ancillary service requirements that they impose on  
13 the grid. This misaligned incentive will continue if the Commission approves  
14 the Solar Integration Charge Stipulation, because solar QFs would be charged  
15 the same fee regardless of the actual ancillary service requirements that they  
16 impose on the grid. For this reason, NCSEA has proposed in this proceeding  
17 that the Commission adopt pricing for ancillary services. As set forth in  
18 NCSEA Witness Tom Beach’s testimony, the cost of ancillary services has  
19 not demonstrably increased across the United States despite the fact that solar  
20 has grown at a high rate. Solar developers in North Carolina actively want to  
21 add energy storage to their existing QFs, and the policies and requirements of

1 the Utilities are keeping them from doing so. Duke’s stance, in particular,  
2 prohibits innovation and private investment which would benefit ratepayers.

3 Witness Snider does not account for the benefits that solar QFs provide  
4 currently and ignores solar’s role in reducing the summer system wide peak  
5 and the role advanced technologies such as battery storage can play in  
6 allowing solar QFs to provide ancillary services to the grid. As pointed out in  
7 the testimony and previously filed affidavits and accompanying reports of Dr.  
8 Ben Johnson<sup>10</sup> and Tom Beach,<sup>11</sup> the integration of solar QFs provides  
9 significant benefits to the grid. The Commission should account for these  
10 benefits in an appropriate manner before considering an integration charge,  
11 rather than ignoring them as done by the Astrapé study.<sup>12</sup>

12 **Q. THE SOLAR INTEGRATION CHARGE STIPULATION STATES**  
13 **THAT THE SOLAR INTEGRATION CHARGE WILL NOT BE**  
14 **APPLIED, OR MAY BE REDUCED FOR FACILITIES THAT CAN**  
15 **OPERATE IN A MANNER THAT “MATERIALLY REDUCES OR**  
16 **ELIMINATES THE NEED FOR ADDITIONAL ANCILLARY**  
17 **SERVICE REQUIREMENTS[.]”<sup>13</sup> DOES THIS CAVEAT**  
18 **ENCOURAGE QFS TO PROVIDE ANCILLARY SERVICES OR**  
19 **ENCOURAGE A ROBUST ANCILLARY SERVICES MARKET?**

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<sup>10</sup> See *NCSEA’s Initial Comments, Attachment 1*, E-100, Sub 158, N.C.U.C. Docket No. E-100, Sub 158, February 12, 2019 (“Johnson Affidavit”), pp. 17-28.

<sup>11</sup> See *NCSEA’s Initial Comments, Attachment 2*, E-100, Sub 158, N.C.U.C. Docket No. E-100, Sub 158, February 12, 2019 (“Beach Affidavit”), pp. 5-6.

<sup>12</sup> *Duke Energy Carolinas and Duke Energy Progress LLC’s Joint Initial Statement and Exhibits*, Docket No. E-100, Sub 158 (November 1, 2018), pp. 30-34.

<sup>13</sup> Solar Integration Charge Stipulation, p. 5.

1 A. No. The Solar Integration Charge Stipulation allows for a reduction or  
2 elimination of the solar integration charge only in Duke territories where Duke  
3 determines that the facility has included “energy storage devices, dispatchable  
4 contracts, or other mechanisms that materially reduce or eliminate the  
5 intermittency of the output from the solar generators[.]”<sup>14</sup> I am concerned that  
6 this will stifle any ancillary services market as developers will be subject to  
7 the determinations of Duke, rather than the Commission. Based on my  
8 experience, in a regulated territory like North Carolina, it is vital for contracts  
9 between private developers and the Utilities to have clear parameters set by  
10 regulators, and for such contracts to be subject to Commission review and  
11 approval.

12 Furthermore, to be eligible to avoid the solar integration charge, the  
13 solar generator must “contractually agree to construct and operate its solar  
14 generating facility and co-located energy storage to meet design specifications  
15 and operational requirements” as determined solely by Duke and as negotiated  
16 between Duke and the solar developers.<sup>15</sup> So not only does the Solar  
17 Integration Charge Stipulation require sole oversight by Duke, but it also  
18 requires the solar developers negotiate and enter into contracts with Duke  
19 where Duke can dictate solar facility design and operations protocols, even if  
20 the QF is smaller than 100 kW.

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<sup>14</sup> *Id.*

<sup>15</sup> *Id.*

1   **Q.   DO YOU BELIEVE THAT THE IMPLEMENTATION OF DUKE’S**  
2       **SOLAR INTEGRATION CHARGE OR DOMINION’S RE-DISPATCH**  
3       **CHARGE IS THE PROPER POLICY TO OFFSET THE VOLITILITY**  
4       **COSTS TO THE GRID THAT DUKE WITNESS SNIDER**  
5       **REFERENCES IN HIS TESTIMONY?<sup>16</sup>**

6   A.   No. The proposed solar integration charge would create an unreasonable and  
7       arbitrary barrier for new solar QFs and a penalty for existing solar QFs, and  
8       overstates the costs of volatility, especially given that the benefits of  
9       distributed solar are ignored. The Utilities’ proposals are harmful to the solar  
10      industry in North Carolina and, as I mentioned earlier, will undercut the recent  
11      statutory mandates in H.B. 589. Furthermore, QFs being built now are much  
12      more likely utilize new technologies that reduce volatility given the  
13      opportunity. This trend could be especially true should the Commission enable  
14      a robust ancillary services market by rewarding QFs who incorporate  
15      beneficial ancillary services.

16   **Q.   HOW WOULD YOU RECOMMEND THE COMMISSION**  
17       **PROCEED?**

18   A.   Rather than penalizing QFs with new fees, the Commission should implement  
19       programs that would allow and reward the interconnection of QFs that provide  
20       ancillary services. This would incentivize QF developers to invest in

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<sup>16</sup> Snider Direct, pp. 34-38.

1 technologies such as smart inverters, battery storage, and other devices and  
2 methods to provide support to the grid on both new and existing facilities.

3 **Q. SHOULD QFS THAT ARE ALREADY OPERATING BE SUBJECT TO**  
4 **THE SOLAR INTEGRATION CHARGE WHEN THEIR PPAS**  
5 **EXPIRE?**

6 A. No. The decision to build these QFs was made based on the business  
7 circumstances that existed at the time of their construction. Subjecting existing  
8 QFs to the Solar Integration Charge when their PPAs expire would be  
9 changing the rules of the road once a vehicle is halfway to its destination.  
10 Second, the Utilities have not holistically considered both the benefits and  
11 costs of the existing projects to the grid, and studies filed with the Commission  
12 show the ability to integrate significantly more renewable energy generation  
13 without significant costs.<sup>17</sup>

14 **Q. HOW DO YOU THINK THIS CAN BE DONE?**

15 A. As an initial matter, I think that the Astrapé Study overstates the costs of  
16 volatility and did not sufficiently consider the benefits of distributed solar  
17 resources. This is outlined in the testimony and affidavits offered by Dr.  
18 Johnson and Mr. Beach. Instead of penalizing QFs for not providing ancillary  
19 services to the grid, a better policy would be for the Commission to incentivize  
20 QFs to provide ancillary services. Such a policy would not only reflect the

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<sup>17</sup> *Direct Testimony of Glen A. Snider on Behalf of Duke Energy Carolinas, LLC and Duke Energy Progress, Inc.*, Docket No. E-100, Sub 140 (April 25, 2014), *Exhibit 1* (entitled “Duke Energy Photovoltaic Study: Carolinas Service Areas”).

1 requirements of H.B. 589, but would also reflect that grid-stabilizing QFs  
2 would be a valuable generation asset should be compensated accordingly.

3 **Q. HOW COULD QFS CURRENTLY IN SERVICE INCORPORATE**  
4 **THIS FRAMEWORK SO AS TO NOT STRAND THOSE ASSETS OR**  
5 **OTHERWISE MAKE THEM UNECONOMIC?**

6 A. Duke and Dominion should allow for QFs currently in service to make  
7 modifications to their systems so as to stabilize the grid, including the addition  
8 of energy storage. This means that QFs under prior avoided cost rate PPAs  
9 would be allowed to upgrade and modernize any and all on site equipment as  
10 long as the maximum export capability is maintained. I would note that such  
11 changes will increase reliability, dispatchability and the amount of clean  
12 energy delivered to the grid at no capital cost to ratepayers. As I mentioned  
13 earlier, the solar industry in North Carolina would welcome the opportunity  
14 to work with the Commission and the Utilities on this issue, with the goal of  
15 allowing existing solar assets to continue to provide electricity to the grid  
16 throughout their useful life in a way that would lead to the greatest benefit to  
17 the grid and to ratepayers.

18 **Q. DO YOU HAVE ANY FURTHER THOUGHTS ABOUT THE SOLAR**  
19 **INTEGRATION CHARGE STIPULATION OR THE FIXED**  
20 **CHARGES PROPOSED BY DUKE AND DOMINION?**

1 A. The Solar Integration Charge Stipulation outlines a two-year refresh for the  
2 requested charge.<sup>18</sup> Duke and the Public Staff outline this as a biennial “review  
3 and update” to Duke’s ancillary services costs, but again Duke would provide  
4 the sole oversight. This two-year refresh will materially affect the ability of  
5 developers to finance QFs. As I stated in my testimony in the last biennial  
6 Avoided Cost proceeding,<sup>19</sup> developers cannot finance projects when a  
7 material term of the contract, namely pricing, can be unpredictably adjusted  
8 every two years. The Solar Integration Charge and the two-year refresh would  
9 undercut the statutorily-mandated H.B. 589 programs such as the CPRE  
10 program or the GSA program. Furthermore, as I stated in my testimony in  
11 Docket No. E-100, Sub 148,<sup>20</sup> North Carolina had robust solar QF  
12 development for a number of years, and this was in large part due to the  
13 certainty and longer term (ten or more years) of the QF PPA mandated by  
14 earlier avoided cost dockets. Adjusting the amount of the Solar Integration  
15 Charge every two years would significantly reduce that certainty. While Duke  
16 and the Public Staff stipulated to a cap to the Solar Integration Charge, a cap  
17 does not reduce the underlying uncertainty and or my concerns regarding lack  
18 of oversight.

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<sup>18</sup> See Solar Integration Charge Stipulation, pp. 7-8.

<sup>19</sup> *Direct Testimony of Carson Harkrader*, Docket No. E-100, Sub 148 (March 28, 2017), pp. 16-17.

<sup>20</sup> *Id.* at pp. 13-14.

1   **Q.   DO YOU BELIEVE THAT DUKE HAS ACCURATELY QUANTIFIED**  
2           **THE VALUE OF ANCILLARY SERVICES COST OF INTEGRATING**  
3           **SOLAR?**

4   A.   No. I agree with Dr. Johnson that the Astrapé Study ignores the fact that  
5           geographically diverse distributed generation benefits the grid. As I stated  
6           above, I am concerned that the Utilities are ignoring the benefits of distributed  
7           generation that are increasingly being recognized and encouraged by other  
8           states and utilities, and ignoring their customer's demand to move very quickly  
9           to a grid dominated by clean energy and large reductions in carbon.

10                 For example as I stated in my testimony in Docket No. E-100, Sub  
11           148, inverter technologies are a technology that can be programmed to  
12           enhance the ability of the grid to ride through low voltage events to prevent a  
13           loss of power for other customers; supply reactive power, which could offset  
14           utility investments in their own supply of this power; and provide other power  
15           quality services which can offset utility expenditures.<sup>21</sup> Inverters, like battery  
16           storage, can provide ancillary services that can stabilize the grid, and QFs  
17           should be allowed and encouraged to make ancillary services available to  
18           benefit the grid.

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

20   A.   Yes.

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<sup>21</sup> *Id.* at pp. 9-10.