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**DIRECT TESTIMONY OF JONATHAN BURKE**

**FOR WILLIAMS SOLAR, LLC**

**BEFORE THE NORTH CAROLINA UTILITIES COMMISSION**

**Docket No. E-2, Sub 1220**

**April 28, 2020**

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

A. My name is Jonathan Burke. My business address is 1447 South Tryon St, Suite 201, Charlotte, NC 28203.

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

A. I am the Country Manager and President of Development for GreenGo Energy US, Inc. (“GreenGo”).

**Q. ON WHOSE BEHALF ARE YOU PROVIDING TESTIMONY?**

A. I am providing testimony on behalf of Williams Solar, LLC (“Williams Solar”) as an authorized agent.

**Q. PLEASE DESCRIBE THE RELATIONSHIP BETWEEN GREENGO AND WILLIAMS SOLAR.**

A. GreenGo is a full-service renewable power developer. In North Carolina, GreenGo is pursuing development of a portfolio of 2 to 5 MW<sub>AC</sub> projects, a number of which qualified for standard offer contracts, protection under House Bill 589, and were signatories to the January 30, 2018 Settlement Agreement between DEP and the solar industry that was filed in Docket No. E-100, Sub 101. GreenGo is responsible

1 for determining whether the projects it develops are commercially viable. In  
2 connection with this, GreenGo is charged with evaluating and procuring  
3 prospective sites for solar projects, obtaining all necessary governmental  
4 authorizations, zoning, engineering, procurement, construction management and  
5 limited financing of the facilities, and achieving interconnection with the  
6 incumbent electric utility. Williams Solar is one of the utility scale solar projects  
7 with proposed distribution interconnection in North Carolina within the portfolio  
8 under GreenGo's management.

9 **Q. PLEASE DESCRIBE YOUR RESPONSIBILITIES FOR GREENGO.**

10 A. I am responsible for the operations, profit and loss of the U.S. division within  
11 GreenGo Energy Group and accountable for the success of the renewable power  
12 portfolio including business development, development and financing, under  
13 management by our shareholders and investors. I oversee the attraction,  
14 recruitment, growth and development of a blended team of development, technical  
15 and construction management personnel in Charlotte, our U.S. headquarters  
16 beginning in 2016. I also oversee additional remote personnel across the  
17 South/Southeast. In my capacity, I act as the authorized agent for the special  
18 purpose entities within the portfolio that we manage in executing binding  
19 agreements related to their respective contracts, including their defense if  
20 necessitated.

21 **Q. PLEASE DESCRIBE YOUR RELATIONSHIP TO WILLIAMS SOLAR.**

1 A. I am an authorized agent for Williams Solar, with the power to take certain actions  
2 on its behalf, including the prosecution of litigation such as this to enforce the  
3 project's rights.

4 **Q. PLEASE SUMMARIZE YOUR BACKGROUND AND PROFESSIONAL**  
5 **EXPERIENCE.**

6 A. I have a B.S. in mechanical engineering from Tulane University; a Master's in  
7 Engineering Management from University of Missouri-Rolla; and an M.B.A. from  
8 Rice University. I was an active duty U.S. Army officer commissioned in 1996  
9 with duty stations in Missouri, Germany, Bosnia-Herzegovina, Kuwait and Atlanta,  
10 Georgia in various leadership capacities before transitioning to the private sector in  
11 late 2001. From 2001 to 2010, I worked in a variety of roles that spanned technical  
12 roles (offshore project engineer for Shell Pipeline in the Gulf of Mexico), internal  
13 project manager and consultant for the transition and repositioning of a retail  
14 businesses after Pennzoil Quaker-State acquisition by Shell, and later business  
15 development manager for Shell WindEnergy, Inc. From 2010 to 2013, I was the  
16 Director of Development for Element Power US, where I led the regional  
17 development of wind and solar projects in the south and east regions. I further  
18 served as a Senior Director of Apex Clean Energy from 2013 to 2015. In 2015, I  
19 became a Vice President at the National Renewable Energy Corporation, where I  
20 jointly led a team resulting in +1GW solar portfolio primarily sited in key regulated  
21 markets across the southeast in North Carolina, South Carolina, Georgia, Florida  
22 and Alabama. I have served as the President of GreenGo since 2017. I have

1 extensive experience related to renewable energy development in general and in the  
2 development and financing of solar generation projects in North Carolina in  
3 particular.

4 **Q. HAVE YOU PROVIDED TESTIMONY IN PRIOR REGULATORY**  
5 **COMMISSION PROCEEDINGS?**

6 A. Yes. I testified on behalf of another solar developer, Lily Solar LLC, regarding an  
7 interconnection dispute between Lily Solar LLC and South Carolina Electric & Gas  
8 before the South Carolina Public Service Commission, in Docket No. 2016-89-E.

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

10 A. My testimony here addresses several issues. First, I provide some background on  
11 the Williams Solar project that is at issue in this proceeding. Second, I describe the  
12 process that led to the dispute before the Commission, which relates to whether the  
13 estimates provided by Respondent Duke Energy Progress, LLC (“DEP”) were  
14 made in good faith. Third, I describe the communications between Williams Solar  
15 and DEP relating to the dispute.

16 **Q. PLEASE DESCRIBE THE WILLIAMS SOLAR PROJECT.**

17 A. Williams Solar is a self-certified Qualifying Facility (“QF”) that has been granted  
18 a certificate of public convenience and necessity by the Commission to construct a  
19 5-MW<sub>AC</sub> solar facility to be located at approximately 8185 Harper House Road,  
20 Newton Grove, Johnston County, North Carolina. See Docket SP-8274, Sub 0.  
21 Contemporaneously with its CPCN application, Williams Solar submitted a  
22 registration statement with the Commission as a new renewable energy facility.

1 **Q. PLEASE DESCRIBE THE HISTORY OF THE WILLIAMS SOLAR**  
2 **INTERCONNECTION REQUEST.**

3 A. Williams Solar submitted an interconnection request to DEP on August 19, 2016,  
4 and signed a System Impact Study Agreement (“SIS Agreement”) on September 8,  
5 2016, although it did not receive a countersigned SIS Agreement from DEP.  
6 Williams Solar was issued queue number NC2016-02927 on October 17, 2016.  
7 Williams Solar was initially identified as a “Project B.” In November 2017,  
8 Williams Solar received a notice that, because Williams Solar did not yet have a  
9 completed SIS, DEP would apply the new criteria set forth in DEP’s Method of  
10 Service Guidelines (“MOS Guidelines”) when evaluating the Williams Solar  
11 interconnection request. In December 2017, more than fifteen months after  
12 Williams Solar signed the SIS Agreement, DEP notified Williams Solar that it was  
13 beginning the Williams Solar System Impact Study.

14 **Q. DO YOU KNOW WHY THERE WAS A DELAY BETWEEN THE SIGNING**  
15 **OF THE SIS AGREEMENT AND THE BEGINNING OF THE WILLIAMS**  
16 **SOLAR SYSTEM IMPACT STUDY?**

17 A. My understanding is that the System Impact Study was delayed while the “Project  
18 A” System Impact Study proceeded as well as delayed by study actions taken by  
19 DEP to process other higher queued solar projects. My understanding is that  
20 Williams Solar was also put on hold while DEP awaited the results of a new cluster-  
21 based study performed by DEP to assess Williams Solar’s contribution to alleged  
22 transmission constraints.

1 **Q. DID DEP COMPLETE A SYSTEM IMPACT STUDY FOR WILLIAMS**  
2 **SOLAR?**

3 A. Yes. DEP transmitted the Williams Solar (“SIS”) results by e-mail on January 28,  
4 2019. The transmittal e-mail is included as Exhibit JB-1 to this testimony. The SIS  
5 report, dated December 20, 2018, is included as Exhibit JB-2 to this testimony.

6 **Q. PLEASE SUMMARIZE THE RESULTS OF THE SYSTEM IMPACT**  
7 **STUDY.**

8 A. As shown Exhibit JB-2, the SIS showed that Williams Solar failed DEP’s circuit  
9 stiffness screen, requiring the use of a 150 Ohm pre-insertion resistor; that the point  
10 of interconnection was downstream of certain fuses or reclosers, requiring the  
11 replacement of devices with reclosers and installing or relating devices; that the  
12 addition of the Williams Solar project would cause service transformers to be added  
13 to a high fault area, requiring retrofitting 71 transformers to incorporate current  
14 limiting fuses, also known as high fault tamers; that the Williams Solar project  
15 would require rebuilding 1.4195 miles of line from single phase to three phase; that  
16 the project passed DEP’s voltage limit screens; and that the project would “create[]  
17 annealing violations,” requiring other upgrades to “correct . . . affected conductors.”  
18 The study concluded that Williams Solar could be connected with a standard  
19 interconnection package and that it would require no substation upgrades or  
20 transmission upgrades.

1 **Q. DID THE SYSTEM IMPACT STUDY REPORT ESTIMATE THE COSTS**  
2 **OF THE REQUIRED INTERCONNECTION FACILITIES AND SYSTEM**  
3 **UPGRADES?**

4 A. Yes. The SIS report estimated that the interconnection facilities would cost  
5 \$60,000; plus require a new line to be constructed with some reconductoring work  
6 that was estimated by DEP to cost \$705,000; and that the protection upgrades  
7 (fuses, reclosers, and high fault tamers) would cost an additional \$69,000, resulting  
8 in a total SIS estimate of \$834,000.

9 **Q. HOW DID THESE ESTIMATES COMPARE WITH WILLIAMS SOLAR'S**  
10 **EXPECTATIONS?**

11 A. The \$60,000 cost for interconnection facilities was consistent with the standard  
12 interconnection package offered by DEP on other projects. The reconductoring  
13 cost of \$705,000 for approximately 2.5 miles of distribution line was higher than  
14 expected. The total estimate of \$834,000 was the highest SIS estimate GreenGo had  
15 received from DEP for any similar sized project under its management up to that  
16 point.

17 **Q. DID GREENGO RELY ON THE SYSTEM IMPACT STUDY RESULTS,**  
18 **INCLUDING THE ESTIMATED COSTS, TO DETERMINE WHETHER**  
19 **TO PROCEED WITH THE WILLIAMS SOLAR PROJECT?**

20 A. Yes.

21 **Q. PLEASE EXPLAIN.**

1 A. GreenGo’s business model is based on identifying and developing solar  
2 photovoltaic generation projects in a profitable manner, ensuring development is  
3 progressed with least development capital at risk for the respective milestones. To  
4 that end, if a project’s upfront development costs—such as interconnection  
5 facilities and system upgrades—are too high, GreenGo will not seek to further  
6 develop a project and will focus its internal and external resources on projects with  
7 greater likelihood of economic contribution to the portfolio’s success. The cost  
8 estimate provided at the SIS stage one of a few key decision points after an  
9 interconnection request is submitted in evaluating a project’s economic return  
10 potential. GreenGo relies on the results of the SIS as an important proxy of  
11 potential economic viability in determining whether to proceed with a specific  
12 project or divert time and resources to others with greater likelihood of economic  
13 viability/success. That is how GreenGo used the Williams Solar SIS cost estimate  
14 in its decision making process on allocation of development capital.

15 **Q. WAS DEP AWARE THAT WILLIAMS SOLAR WOULD RELY ON THE**  
16 **ESTIMATE PROVIDED IN THE SYSTEM IMPACT STUDY TO DECIDE**  
17 **WHETHER TO MOVE FORWARD WITH THE PROJECT?**

18 A. Yes. First, I think it is fair to say that the very purpose of the estimate provided in  
19 the SIS report is to let the interconnection customer know whether the project is  
20 both technically and economically viable before additional costs are incurred. As  
21 DEP stated in its e-mail transmitting the system impact study report to Williams  
22 Solar:



1           The purpose of this e-mail is for a decision to be made whether or  
2           not to continue moving forward with the project for the final costs  
3           or to withdraw.

4           Exhibit JB-1. In addition, in the 2018 CPRE proceeding, in its reply comments  
5           filed on September 19, 2018, DEP (along with Duke Energy Carolinas, LLC) stated  
6           as follows:

7           The Companies acknowledge that the “Preliminary Estimated  
8           Upgrade Cost” established through the System Impact Study may,  
9           and likely will, differ some from the final Network Upgrade costs  
10          established through the Facilities Study and included in the  
11          Interconnection Agreement. Cost estimates are by definition not  
12          certain, and even the ultimate construction cost to be potentially  
13          trued-up under the Interconnection Agreement after Network  
14          Upgrades are constructed may be different from the Upgrades  
15          originally identified in the IA. However, the Preliminary Estimated  
16          Upgrade Cost does provide a valid ballpark estimate of the likely  
17          costs to safely and reliably interconnect the Generating Facility and  
18          therefore, it is reasonable to require an Interconnection Customer to  
19          take an affirmative financial step to demonstrate its intent to proceed  
20          based on estimated costs rather than allowing the Interconnection  
21          Customer an additional six months to a year to decide.

22          Reply Comments, Docket No. E-100, Sub 101, available at  
23          [https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=fee32c9d-c673-4e54-a3a0-](https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=fee32c9d-c673-4e54-a3a0-a60e22ad06df)  
24          [a60e22ad06df](https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=fee32c9d-c673-4e54-a3a0-a60e22ad06df). It seems clear to me that DEP was not just aware that Williams  
25          Solar would rely on the estimate, but that DEP actually intends—and sought  
26          changes to the Interconnection Procedures requiring—that the estimate provided at  
27          the SIS stage be the basis of significant financial decisions made by interconnection  
28          customers in an effort to optimize DEP’s processing of its queue.

1 **Q. DID DEP PROVIDE ANY CAVEATS OR LIMITATIONS ON THE**  
2 **ACCURACY OR USEFULNESS OF THE SYSTEM IMPACT STUDY**  
3 **ESTIMATES?**

4 A. Yes. DEP’s transmittal e-mail states that the estimates “do not account for the  
5 terrain that DEP personnel will encounter to connect” the project to the grid. There  
6 are no other caveats, other than a statement that “costs can potentially increase” if  
7 the interconnection customer chooses an infrastructure route or point of delivery  
8 other than those used by DEP in completing the system impact study. Given  
9 Williams Solar was not changing its infrastructure route, point of delivery nor  
10 triggering Network Upgrades, I felt that the SIS estimate was likely a good proxy  
11 of the final cost likely to be expected for the project.

12 **Q. DO THE NC INTERCONNECTION PROCEDURES PROVIDE ANY**  
13 **REQUIREMENTS REGARDING SYSTEM IMPACT STUDY**  
14 **ESTIMATES?**

15 A. Yes. Section 4.3.4 of the 2015 Interconnection Procedures—which was in effect at  
16 the time the Williams Solar system impact study was completed—requires that the  
17 Preliminary Estimated Upgrade Charge be a “preliminary indication of the cost and  
18 length of time that would be necessary to . . . implement the interconnection.” The  
19 term “Preliminary Estimated Upgrade Charge” is defined as “[t]he estimated charge  
20 for Upgrades that is developed using unit costs . . . . This charge is not based on  
21 field visits and detailed engineering cost calculations.” NC Glossary of Terms  
22 (2015). Similarly, section 4.3.5 requires that the Preliminary Estimated

1 Interconnection Facilities Charge be “a preliminary non-binding indication of the  
2 cost and length of time that would be necessary to provide the Interconnection  
3 Facilities.” The term “Preliminary Estimated Upgrade Charge” is defined as “[t]he  
4 estimated charge for Interconnection Facilities that is developed using unit costs  
5 . . . . This charge is not based on field visits and detailed engineering cost  
6 calculations.” The SIS Agreement, in sections 12.0 and 13.0, requires the estimates  
7 to be completed as part of the SIS.

8 **Q. DO THE INTERCONNECTION PROCEDURES REQUIRE THE SYSTEM**  
9 **IMPACT STUDY ESTIMATES TO BE MADE IN GOOD FAITH?**

10 A. The North Carolina Interconnection Procedures (“Procedures”) do not use the  
11 words “good faith” in connection with the Preliminary Estimated Upgrade Charge  
12 or the Preliminary Estimated Interconnection Facilities Charge. However, the  
13 Procedures do require that other similar estimates be “good faith” estimates. E.g.,  
14 Interconnection Procedures §§ 2.2.1.2, 3.2.2.2, 3.2.2.5, 3.3.1. More generally, it is  
15 my understanding that parties to contracts such as the SIS Agreement must carry  
16 out their contractual obligations in good faith. Looking at this alternatively from a  
17 market certainty perspective with fairness in mind, it seems to me that it would be  
18 bad policy and inconsistent with the Commission’s mandates to allow estimates to  
19 be provided that were not “good faith” estimates. So, despite the lack of explicit  
20 “good faith” language in the Procedures or the SIS Agreement regarding the SIS  
21 cost estimates, such estimates must be good faith estimates. Certainly, I expected  
22 that DEP’s estimates were being made in good faith and based on diligent inquiry.

1 **Q. WHEN YOU SAY YOU EXPECTED THAT DEP WAS PROVIDING**  
2 **ESTIMATES IN GOOD FAITH WHAT DOES THAT ENCOMPASS IN**  
3 **YOUR VIEW?**

4 A. By this I mean that, at a minimum, the SIS estimate would be made using industry  
5 standard estimating methodologies and assumptions and be based on actual, up-to-  
6 date, commercially reasonable cost data for similar work. Since DEP has  
7 interconnected a large amount of distributed PV generation in addition to work on  
8 the grid for its own PV generation purposes, I would expect DEP to have both the  
9 data and experience to make accurate estimates consistent with conduct of  
10 professional engineers.

11 **Q. DID WILLIAMS SOLAR CONSIDER THE WILLIAMS SOLAR PROJECT**  
12 **VIALE AFTER RECEIVING THE \$834,000 SYSTEM IMPACT STUDY**  
13 **ESTIMATE?**

14 A. Yes. Although the estimated interconnection facilities and system upgrade costs  
15 were higher than anticipated, the SIS costs were still within the range that GreenGo  
16 would consider to be worth pursuing and deploying its time and resources toward  
17 perfecting development. Recognizing that the SIS estimates are nonbinding and  
18 that the actual costs could vary somewhat, but also assuming the initial estimate  
19 was reasonably accurate, I considered Williams Solar to be both technically and  
20 potentially economically viable, although marginal, with combined upfront costs  
21 of approximately \$834,000.

1 **Q. PLEASE EXPLAIN WHY YOU CONSIDERED THE PROJECT TO BE**  
2 **“MARGINAL.”**

3 A. Based on GreenGo’s experience and assumptions, federal investment tax credit  
4 (“ITC”) eligible capital expenses typically run approximately \$1 million to \$1.5  
5 million per megawatt DC of a proposed solar generation facility in North Carolina.  
6 Variance in installed costs typically result from panel and racking selection, civil  
7 and subsurface variations, environmental controls, site control option, and other  
8 factors. This translates to approximately \$7 million to \$10.5 million in ITC eligible  
9 costs for a 5 MW<sub>AC</sub> standard offer generation facility (approximately 7 MW<sub>DC</sub>).  
10 Opportunity analysis under economic conditions that change over time can be  
11 extremely complex and require significant financial modeling expertise. Therefore,  
12 for simplicity purposes and as an illustrative example, GreenGo developed an  
13 investment rule of thumb in analyzing its solar development capital costs for its  
14 portfolio of Covered Projects under HB 589 and its Settlement Agreement within  
15 DEP’s service territory. In our DEP “rule of thumb,” if a project’s non-tax-credit  
16 eligible expenses exceed 15% of the fully burdened tax eligible expenses, that is a  
17 reasonable indicator that the project will likely become uneconomical with all other  
18 factors considered. Thus, a 5 MW<sub>AC</sub> project like Williams Solar may be considered  
19 economical when non-tax eligible costs—which include interconnection costs, land  
20 acquisition costs, ROW costs, system upgrades and network upgrade costs—are  
21 less than approximately \$1 million, but would generally be considered  
22 uneconomical when such costs approach \$1.5 million or more. This rule of thumb

1 is consistent with my experience with distribution connected solar projects in North  
2 Carolina qualified under similar offtake agreements financed in DEP's service  
3 territory by GreenGo. At \$834,000, Williams Solar was close to the economically  
4 viable line for GreenGo. The rule of thumb is based on an assumption of the full  
5 30 percent income tax credit; with the decreasing solar income tax credit, the  
6 amount of supportable non-tax eligible costs would be less than \$1.5 million.

7 **Q. DID WILLIAMS SOLAR DECIDE TO CONTINUE WITH THE**  
8 **INTERCONNECTION PROCESS AND FURTHER DEVELOP THE**  
9 **PROJECT?**

10 A. Yes, based upon the results of the SIS, GreenGo determined the project was viable.

11 **Q. WHAT DID WILLIAMS SOLAR DO FOLLOWING THE SYSTEM**  
12 **IMPACT STUDY?**

13 A. Williams Solar executed a Facilities Study Agreement with DEP on February 22,  
14 2019, to continue the study process. A copy of the FSA is attached hereto as Exhibit  
15 JB-3. Meanwhile, Williams Solar continued addressing siting issues to support  
16 construction of the project.

17 **Q. PLEASE EXPLAIN THE SITING ISSUES RELATING TO THE**  
18 **WILLIAMS SOLAR PROJECT.**

19 A. The Williams Solar project is sited in Johnston County. In August 2016, Williams  
20 Solar leased a parcel of land (Property) on which the project would be developed.  
21 The Property is somewhat irregularly shaped requiring special design  
22 considerations be appropriately factored into consideration. Furthermore, the

1 county's zoning ordinance would require a 150 foot setback on all sides of the  
2 Property. If these zoning setbacks were enforced and no variance was allowed,  
3 Williams Solar could not be constructed at full size even after down-sizing within  
4 NCIP limits. Therefore, in January 2019, Williams Solar requested a variance from  
5 Johnston County that would reduce the setback requirements. Because Williams  
6 Solar determined to continue with the project based on the SIS results, Williams  
7 Solar continued pursuit of the requested variance. A hearing on the variance request  
8 was held on February 27, 2019, and the variance was denied. Williams Solar and  
9 its legal counsel then pursued an appeal of the decision denying the variance. In  
10 parallel with the appeal, Williams Solar pursued and obtained an option to purchase  
11 the neighboring parcel of land to augment the Property as a fallback in case the  
12 appeal failed. In July 2019, the appeal was decided against Williams Solar.

13 **Q. WOULD THE WILLIAMS SOLAR PROJECT STILL BE CONSIDERED**  
14 **VIALE IF WILLIAMS SOLAR HAD TO EXECUTE THE PURCHASE**  
15 **OPTION?**

16 A. Yes. Using the rule of thumb described above, Williams Solar would still be within  
17 what GreenGo would consider a marginal, but economically viable project.

18 **Q. DID DEP COMPLETE A FACILITIES STUDY FOR THE WILLIAMS**  
19 **SOLAR PROJECT?**

20 A. Yes. DEP sent the results of the facilities study by e-mail on July 30, 2019. The  
21 transmittal e-mail is attached hereto as Exhibit JB-4.

22 **Q. PLEASE SUMMARIZE THE RESULTS OF THE FACILITIES STUDY.**

1 A. With no change to the scope of work described in the system impact study report,  
2 the facilities study report estimated a cost of \$1,388,374.26 (including 7% North  
3 Carolina sales tax) for system upgrades and \$196,495.13 (including 7% North  
4 Carolina sales tax) for interconnection facilities, for a total of \$1,584,869.39, or an  
5 increase of approximately 90% from the SIS estimates.

6 **Q. ASSUMING THE FACILITIES STUDY ESTIMATE IS AN ACCURATE,**  
7 **GOOD FAITH ESTIMATE, WOULD THE WILLIAMS SOLAR PROJECT**  
8 **STILL BE VIABLE?**

9 A. No. Again, using the rule of thumb above, the Williams Solar interconnection  
10 facilities and upgrade costs—by themselves and without considering the extra cost  
11 of the purchase option Williams Solar would be required to execute, before  
12 factoring other project specific technical requirements—would render the project  
13 uneconomical.

14 **Q. WOULD WILLIAMS SOLAR HAVE PURSUED DEVELOPMENT OF THE**  
15 **PROJECT IF THE SYSTEM IMPACT STUDY ESTIMATE HAD**  
16 **TOTALED NEARLY \$1.6 MILLION?**

17 A. No. At that point, assuming the estimate was substantiated, we would have  
18 withdrawn the interconnection request and terminated the project. Most  
19 importantly, we would not have made any of the investments in the project that we  
20 made after receiving the system impact study report on January 28, 2019, but before  
21 we received the facilities study report on July 30, 2019.



1 **Q. HOW MUCH DID WILLIAMS SOLAR SPEND EXTERNALLY IN**  
2 **FURTHERANCE OF DEVELOPING THE WILLIAMS SOLAR PROJECT**  
3 **BETWEEN JANUARY 28, 2019, AND JULY 30, 2019?**

4 A. The external expenditures on the Williams Solar project are detailed in Exhibit JB-5  
5 hereto. Williams Solar spent external development costs of approximately  
6 \$56,213.80, as described in more detail in Exhibit JB-5, between receipt of the SIS  
7 report and receipt of the facilities study results. Williams Solar would not have  
8 spent these funds nor allocated its internal resources if the SIS estimate had been in  
9 excess of \$1.5 million, assuming such DEP results were substantiated.

10 **Q. SINCE RECEIVING THE FACILITIES STUDY ESTIMATE, HAS**  
11 **WILLIAMS SOLAR MADE ADDITIONAL INVESTMENT IN THE**  
12 **PROJECT?**

13 A. Yes.

14 **Q. HOW COULD ADDITIONAL INVESTMENT IN THE PROJECT BE**  
15 **JUSTIFIED IF THE PROJECT IS NOT VIABLE IN LIGHT OF THE**  
16 **FACILITIES STUDY RESULTS?**

17 A. Based on the extreme disparity between the SIS estimates and the facilities study  
18 estimates, it was unclear whether either of the estimates provided to Williams Solar  
19 was accurate. Williams Solar continued making the minimal investments necessary  
20 to keep the project viable while pursuing clarification through the informal dispute  
21 process and through this formal complaint proceeding.

1 **Q. DID WILLIAMS SOLAR REQUEST ADDITIONAL INFORMATION**  
2 **REGARDING THE INCREASED ESTIMATE?**

3 A. Yes. By e-mail on July 30, 2019, a copy of which is attached hereto as Exhibit  
4 JB-6, Williams Solar requested additional information regarding the increased  
5 estimate, including: an update to the line item costs provided in the SIS report and  
6 a request for a “detailed cost break-down”; confirmation that the scope of work did  
7 not change; and a statement regarding the reasons for the increase in cost; and  
8 requesting a construction planning meeting to “have a detailed discussion about  
9 costs.”

10 **Q. DID DEP RESPOND TO THIS REQUEST?**

11 A. Yes. As shown in Exhibit JB-6, DEP responded on July 31, 2019, confirming that  
12 the scope of work to be completed had not changed but stating with regard to the  
13 request for a “detailed cost break down” that DEP “cannot provide this level of  
14 detail.” DEP stated with regard to the reasons for the increase that

15           After several true-ups that we have conducted on similar projects,  
16           we have found the initial costs that were provided historically (both  
17           ballpark costs, and detailed estimates) to be significantly  
18           underestimated.

19 Williams Solar and DEP representatives also held a construction planning meeting.  
20 Ultimately, none of the communications provided Williams Solar with enough  
21 information to determine what had happened in DEP’s estimating process and  
22 whether, or which, estimate was the more accurate estimate—we were truly  
23 puzzled. Given that DEP refused to provide any further explanation of the new

1 estimate, Williams Solar's only option, at that point, was to either take DEP's word,  
2 or to initiate the informal dispute process to defend the project's rights, which has  
3 led us here.

4 **Q. DID WILLIAMS SOLAR SUBMIT A NOTICE OF DISPUTE TO DEP**  
5 **REGARDING THE ESTIMATES?**

6 A. Yes. Williams Solar submitted a notice of dispute on September 9, 2019. A copy  
7 of the notice of dispute is attached hereto as Exhibit JB-7.

8 **Q. PLEASE SUMMARIZE THE BASIS OF THE NOTICE OF DISPUTE.**

9 A. As discussed above, there was an enormous disparity between the SIS estimate and  
10 the facilities study estimate. I had never seen such a large disparity before in my  
11 experience in North Carolina with distribution projects connected to DEP's system.  
12 In particular, the system upgrades estimate jumped from \$774,000 in the system  
13 impact study report to \$1,388,374.26 (including sales tax) in the facilities study  
14 report without any increase in DEP scope.

15 **Q. DID DEP RESPOND TO THE NOTICE OF DISPUTE?**

16 A. Yes, DEP responded by letter dated October 2, 2019. A copy of the response is  
17 attached hereto as Exhibit JB-8.

18 **Q. HOW DID DEP'S RESPONSE EXPLAIN THE DISPARITY BETWEEN**  
19 **THE SYSTEM IMPACT STUDY ESTIMATE OF UPGRADE COSTS AND**  
20 **THE FACILITIES STUDY ESTIMATE OF UPGRADE COSTS?**

21 A. DEP stated as follows:

1           The revised cost estimate is a product of the more detailed  
2           engineering that the Companies performed as part of the Facilities  
3           Study. In addition, the revised estimate has been informed by DEP’s  
4           extensive recent experience in connection with its nation-leading  
5           interconnection successes. Specifically, as the Company has gained  
6           experience in completing the interconnection of thousands of  
7           megawatts of solar generating facilities, it has gathered a substantial  
8           amount of information concerning the actual cost of Upgrades.  
9           Consistent with Good Utility Practice, the Company has endeavored  
10          to use this information to continually refine its estimates. In the case  
11          of Williams Solar, the Company utilized such actual cost data to  
12          refine the Upgrade cost estimates to ensure that such estimates better  
13          reflect actual costs being incurred in the field. There are a number  
14          of factors that have contributed to escalating actual costs, including  
15          increase labor and equipment costs.

16   **Q.    WHY DID DEP’S RESPONSE NOT SATISFY WILLIAMS SOLAR OR**  
17   **OTHERWISE RESOLVE THE DISPUTE?**

18   A.    DEP’s response raises more questions than it answers. Critically, although DEP  
19          references “more detailed engineering,” DEP’s response does not actually state that  
20          the increased cost estimate is a result of detailed engineering considerations.  
21          Rather, DEP touts its “extensive recent experience” in interconnection and claims  
22          it “has endeavored . . . to continually refine its estimates.” However, DEP also  
23          states the “refined estimate”—provided six months after the SIS was sent to  
24          William Solar, with nearly doubled costs—was affected by “escalating actual costs,  
25          including increase labor and equipment costs.” It seems implausible that such costs  
26          nearly doubled over the course of six months given the lack of macro-economic  
27          changes or fundamental shifts in the North Carolina market that would precipitate  
28          such large-scale increase. DEP’s explanation that it has sought to “continually  
29          refine its estimates” seemed fundamentally inconsistent with the increased estimate

1 received by Williams Solar and, to the extent such refinements constitute new  
2 policies, screens, or practices, would contravene the commitments made in the  
3 Settlement Agreement to Covered Projects like Williams Solar. In addition, as  
4 discussed above, the SIS estimate was already higher than the cost we would have  
5 expected for the identified upgrades. From our point of view, it seemed more  
6 plausible that either the first estimate, the second estimate, or both were not actually  
7 based on sound estimating methods or data. To us, the questions DEP's response  
8 raised include:

- 9 • If DEP has "endeavored" to "continually refine its estimates," how often  
10 has DEP actually modified or updated its estimating process?
- 11 • Prior to providing Williams Solar with the system impact study report, when  
12 was the last time DEP updated its cost estimating process or the data used  
13 in that process?
- 14 • How recent is the data DEP used to "refine" its estimates?
- 15 • What factors actually contributed to the increase in the Williams Solar  
16 estimates?
- 17 • How was the increase actually attributable to engineering considerations, or  
18 does the change reflect changing economic circumstances such as increase  
19 labor, materials, and equipment costs?
- 20 • What, if any, other unstated factors contributed to the increased estimate?
- 21 • Why would DEP be reluctant to share detailed information to justify the  
22 change from SIS to Facility Study results?

1 **Q. HOW DO YOU RESPOND TO DEP’S CONTENTION THAT THE SYSTEM**  
2 **IMPACT STUDY RESULTS ARE “HIGH LEVEL” ESTIMATES?**

3 A. DEP’s response does refer to and rely on the “high level estimates” language  
4 contained in the current Procedures. However, at the time the SIS was completed  
5 for Williams Solar, the Interconnection Procedures did not contain that language.  
6 Instead, as discussed at pages 10-11 of my testimony, the Procedures referred to  
7 “unit costs.”

8 **Q. DID WILLIAMS SOLAR MAKE ANY OTHER EFFORT TO**  
9 **INFORMALLY RESOLVE THE DISPUTE?**

10 A. In light of the positions taken in DEP’s response, and its contention, see Exhibit  
11 JB-8 at 2 that “there is . . . no obligation under the NC Procedures for the Company  
12 to provide justification for changes in cost estimates between . . . the System Impact  
13 Study and the . . . Facilities Study,” additional informal negotiation could not  
14 resolve this dispute. And, as with many other disputes relating to the  
15 interconnection process, there was little Williams Solar could do without using  
16 formal discovery processes to obtain more information from DEP. It is unfortunate  
17 that a solar developer is forced to expend substantial internal and external resources  
18 (including uncapped opportunity costs) associated with advancing a formal  
19 complaint to get what seems like basic information about changes that, on their  
20 face, are irreconcilable and incomprehensible. It makes me wonder how many  
21 other similar situations fly under the radar because the developer is unable or  
22 unwilling to commit the time and resources necessary to enforce their rights—

1 especially given concerns of the potential for retribution by Duke Energy going  
2 forward in and outside of the North Carolina market.

3 **Q. DID DEP’S ANSWER AND MOTION TO DISMISS IN THIS**  
4 **PROCEEDING CLARIFY ANY ISSUES RELATING TO THE ESTIMATES**  
5 **PROVIDED TO WILLIAMS SOLAR?**

6 A. No. Again, DEP’s answer raised more questions than it answered. For instance,  
7 DEP’s refers to its use of “historic cost data for similar projects” to develop SIS  
8 estimates, Answer at 3, but does not identify what data was used to create the  
9 Williams Solar estimate. DEP states that it “has recently taken steps to refine the  
10 Facilities Study cost estimation process based upon Duke’s nation-leading  
11 experience interconnecting utility-scale Generating Facilities to its distribution  
12 system,” Answer at 4, but does not state how recently DEP took those steps or  
13 provide any insight concerning, or explanations for, the assumptions and processes  
14 its used to arrive at the competing estimates. DEP states that “Duke’s recent  
15 experience . . . has demonstrated that the preliminary estimated costs produced  
16 during the System Impact Study and the more detailed estimated cost produced . .  
17 . during Facilities Study have often been below the actual costs to complete the  
18 interconnection,” and identifies factors contributing to cost increases, Answer at 4-  
19 5, but does not identify *when* DEP came to its belief that its study process estimates  
20 were inaccurate, nor does it justify with facts what actual unit costs were the  
21 underestimated drivers of said cost increases. DEP states that the “primary factors  
22 that caused the cost estimate produced” in the facilities study to be higher than the

1 SIS estimate were increased labor and equipment costs (factors 1-5), and  
2 unforeseen circumstances and increased regulatory compliance (factor 6), Answer  
3 at 4-5. Again, however, DEP’s statement does not clarify how these factors  
4 changed, if at all, in the six months between the issuance of the SIS and the issuance  
5 of the facilities study. DEP also states that its “implementation of its improved cost  
6 estimating practice occurred after [Williams Solar] had received its System Impact  
7 Study cost estimates, which led to a substantial increase in its cost estimates.”  
8 Answer at 6.

9 **Q. HAS WILLIAMS SOLAR UNDERTAKEN FORMAL DISCOVERY IN**  
10 **THIS PROCEEDING?**

11 A. Yes. Williams Solar sent interrogatories and document requests to DEP, and DEP  
12 has responded. Attached hereto as Exhibit JB-9 are DEP’s initial written discovery  
13 responses, and attached hereto as Exhibit JB-10 are supplemental written responses  
14 provided by DEP.

15 **Q. DO DEP’S RESPONSES SHED ANY LIGHT ON THE QUESTIONS**  
16 **RELATING TO UPDATES TO DEP’S ESTIMATING PROCESS THAT**  
17 **ARE RAISED BY DEP’S RESPONSE TO WILLIAMS SOLAR’S NOTICE**  
18 **OF DISPUTE OR BY DEP’S ANSWER?**

19 A. Yes.

20 **Q. PLEASE EXPLAIN.**

21 A. While DEP’s Response and its Answer refer to “continual[.]” and “proactive”  
22 efforts to update DEP’s cost estimating process, DEP’s discovery responses



1 unequivocally show otherwise. In fact, the estimating tool used to generate SIS  
2 cost estimates was not updated, other than cosmetically, during the period January  
3 1, 2015, through June 2019. DEP Resp. 1-7 (“The cost data per line item values  
4 were not updated during the period January 1, 2015 through June 2019 . . . .”), 1-8  
5 (“DEP did not modify the procedure or tools used for estimating System Impact  
6 Study costs during the period 2015 throughout June 2019.”); DEP Supp. Resp. 1-6  
7 (“DEP clarifies its initial response to confirm that adjustment factors were added  
8 prior to 2015 and in June 2019. From . . . 2015 to June 2019, no changes were  
9 made in the form of adjustment factors, or line item costs.”). The tool used to create  
10 the Williams Solar SIS estimate “was created using completed distribution work  
11 orders completed prior to 2015.” DEP Supp. Resp. 1-3. DEP began investigating  
12 discrepancies between actual costs and cost estimates at least as early as Q1 2018,  
13 and continued reviewing evidence of discrepancies later that year. DEP Resp. 1-  
14 15. In other words, DEP understood for nearly a year or more before it provided  
15 the SIS results to Williams Solar that its estimating process and data points were  
16 aging. When DEP eventually updated its estimating process, it appears that the  
17 data DEP used was from “100+ vintage 2015-2018 commercially operating  
18 distribution interconnected projects in DEP and DEC,” DEP Resp. 1-15; that is, the  
19 data would have been available prior to the January 2019 issuance of the Williams  
20 Solar SIS results. Furthermore, DEP’s response begins to shed light on new charges  
21 factored DEP factored into its estimation process that appear to layer new and

1 additional soft costs onto Williams Solar derived primarily from DEP’s excessive  
2 use of contingency and overheads.

3 **Q. DO DEP’S DISCOVERY RESPONSES SHOW THAT IT HAS REVISED**  
4 **ITS SYSTEM IMPACT STUDY ESTIMATING TOOL TO PRODUCE**  
5 **MORE ACCURATE RESULTS FOR FUTURE PROJECTS?**

6 A. No. DEP produced a file, “SIS Estimation Tool Rev1,” which DEP states was  
7 created in June 2019, presumably for use with projects after that date. Duke Resp.  
8 1-7. DEP states that “DEP determined that the SIS Estimation Tool Rev 1 needed  
9 to have an additional contingency factor of 2.0 added to more accurately reflect the  
10 estimate of interconnection facilities and system upgrade costs.” *Id.* A review of  
11 the revised estimating tool (“Rev1”), a copy of which is attached hereto as Exhibit  
12 JB-11, shows that it is substantially identical to the tool used to create the Williams  
13 Solar estimate, (“Williams Solar Estimation Tool SIS.xlsx,” a copy of which is  
14 attached hereto as Exhibit JB-12), except that the output is multiplied by a factor of  
15 2, as shown in cell J13. That is, DEP’s “most updated” SIS estimation tool, DEP  
16 Resp. 1-1, is still using the exact same pre-2015 cost data to produce SIS estimates,  
17 and then it is multiplying the output by 2. This “estimation-by-multiplication”  
18 approach shows that DEP’s intention is to merely increase the cost burden for  
19 developers—not to arrive at a good faith estimate of actual costs.

20 **Q. DO YOU HAVE ANY CONCERNS ABOUT THE LEGITIMACY OF THE**  
21 **FACILITIES STUDY ESTIMATE PROVIDED TO WILLIAMS SOLAR?**

1 A. Yes. I was very surprised to see that the facilities study estimate was not what I  
2 would regard as a legitimate or true estimate—the sort of estimate which would  
3 result from adding costs based on an evaluation of the project scope. Instead, the  
4 DEP’s facilities study estimate took these estimated costs and then subjected them  
5 to a series of mathematical multipliers that seem intended to drive up the total  
6 estimate rather than actually estimate true costs.

7 The tool used by DEP, the RET, is described in the document DR No. 1-3  
8 Revised Estimating Tool Description.docx, a copy of which is attached hereto as  
9 Exhibit JB-13. This document describes how DEP uses Maximo—the tool DEP  
10 uses for its own distribution work—and then then adjusts that result upward based  
11 on a number of multipliers. It seems unreasonable to me that the output of the  
12 estimating software that DEP uses for its own distribution work needs to be adjusted  
13 upward to accurately estimate the cost of interconnecting independent solar  
14 projects. More specifically, I am concerned that DEP’s application of labor and  
15 equipment cost adjustments, contingencies, and overheads as applied in the RET  
16 are divorced from any actual consideration of the expected costs associated with  
17 the Williams Solar project.

18 With regard to the contingencies DEP has applied, although I understand  
19 that construction costs can vary in practice, it surprises me that a company with as  
20 much experience as DEP would need to build in such a large contingency at the  
21 detailed design stage which under professional engineering norms should be closer  
22 to actual costs. And as to the overheads included by DEP, to my knowledge, DEP

1 has not substantiated the calculation of overheads applied it charges to  
2 interconnection customers like Williams Solar, whether at the study stage or after  
3 actual construction. From what I can perceive, there is no transparency and no way  
4 for interconnection customers to determine if the contingencies, estimated  
5 overheads, or the overheads ultimately charged by DEP, are fair or reasonable. The  
6 result I fear is an uncontrolled and undocumented allocation of soft costs  
7 (overheads and not actuals) by DEP outside of regulatory supervision to improve  
8 its profit margin by removing unallocated or “stranded” costs. I also am concerned  
9 that DEP could use this approach to gross-up similar level of soft costs onto its own  
10 generation in an effort to increase its rate base.

11 More broadly, although DEP does state that its actual costs are based on  
12 competitive bidding, see, e.g., Resp. 1-3, I am not aware of any real controls  
13 implemented by DEP on challenging the potential rise of actual costs over time of  
14 interconnection facilities and upgrades similar to how it performs its supply chain  
15 bidding strategy for its own generation. DEP is not bound by the estimates provided  
16 and, because all costs are passed on to interconnection customers, DEP has little  
17 incentive to control actual costs paid to third parties who perform the work or to  
18 seek competitive bids to drive prices lower. Given the lack of incentive on DEP’s  
19 part, it does not surprise me that DEP has allegedly seen a significant escalation in  
20 the costs and the amount of labor hours required to complete interconnection-  
21 related projects. It is therefore unclear to me whether the “actual” costs incurred  
22 by DEP in practice represent commercially reasonable costs. The only recourse for

1 interconnection customers for challenging higher costs is the complaint process  
2 under the Interconnection Procedures, which may not be economically rational for  
3 interconnection customers to pursue or may ultimately not exist in the future if the  
4 Commission were to approve a transition to cluster study approach for distribution  
5 projects going forward.

6 **Q. HOW DOES THE INCREASED WILLIAMS SOLAR ESTIMATE**  
7 **COMPARE TO OTHER ESTIMATES GREENGO HAS RECEIVED?**

8 A. Attached as Exhibit JB-14 is a confidential presentation created by GreenGo  
9 relating to the North Carolina portfolio of projects protected under HB 589 and the  
10 subsequent Settlement Agreement under its management. As shown on slide 2, the  
11 projected costs for the projects have increased significantly since 2016. The  
12 increases are due in large part to raising technical barriers such as its LVR policy,  
13 elimination of mitigation options like dedicated and/or double-circuit options,  
14 changes to planning criteria and policies, as well as, new technical requirements  
15 that DEP and DEC have unilaterally added to the interconnection process, including  
16 direct transfer trip (“DTT”), line upgrades, and substation modifications—each of  
17 which has not only resulted in increased costs but also has the dual effect of  
18 extending the time DEP requires to construct and commission the infrastructure  
19 between IA execution and the in-service dates for distribution connected projects.  
20 The loss of time is just as alarming as Williams Solar, like other HB 589 projects,  
21 loses precious months under its standard offer contract given the start of its 15-year  
22 PPA does not coincide with in-service date by the regulated utility. By comparison

1 in ERCOT, where incentives are more aligned between regulated utilities and IPPs,  
2 a large scale transmission project that funds a tap of an existing 345kV line  
3 triggering the need for a new switchyard and ring-bus configuration only takes  
4 approximately 15 months from IA posting of funds to in-service.

5 Williams Solar stands out in terms of the absolute size of the increase in its  
6 estimate. However, a number of other projects have seen changes of similar  
7 proportion, as shown on slide 3. In one case, DEP increased system upgrade costs  
8 for one of GreenGo's other projects where we have executed the IA and posted the  
9 required cash deposit from \$0 to \$31,922.51—in other words, DEP projects  
10 increased costs where no upgrades were originally planned, no work will be  
11 performed, nor identified under its Facility Study results or IA. While I expect this  
12 may simply be an error, it does concern me in that it suggests that DEP's new  
13 estimating process is not grounded in rational risk management nor good utility  
14 practice but more akin to DEP profit optimization or, at a minimum, not as careful  
15 as it should be when millions of dollars are at stake for interconnection customers  
16 seeking to obtain access to Duke's regulated distribution system. Furthermore,  
17 GreenGo and its investors have tied up nearly \$1 million in interconnection  
18 deposits waiting for Duke to process our applications since the portfolio's inception  
19 in 2016. To date, a significant portion of our portfolio is still waiting for Duke to  
20 finalize the interconnection study results—four (4) years and counting where  
21 protracted delay reduces the real tenor of our standard offer contracts with each  
22 ongoing day the passes by.

1 **Q. ARE YOU AWARE THAT OTHER INTERCONNECTION CUSTOMERS**  
2 **HAVE CHALLENGED DISCREPANCIES BETWEEN DEP’S ESTIMATES**  
3 **AND ACTUAL COSTS?**

4 A. Yes. I am aware that a number of formal complaints have been filed against DEP.  
5 *E.g.*, Docket No. E-2, Sub 1229, 1230, 1231, 1233, 1234, 1236, 1237, 1238, 1239,  
6 1242, 1243, 1244, 1245, 1246. My understanding is that these complaints are  
7 based, primarily, on discrepancies between the cost estimates provided by DEP in  
8 interconnection agreements and the actual costs incurred by DEP—which DEP  
9 seeks to assign to the interconnection customers. Given DEP’s concession that it  
10 did not update its cost estimating processes between 2015 and June 2019, it is  
11 unsurprising that the actual costs incurred by interconnection customers vary from  
12 the estimates provided by DEP. It will be instructive to learn how much of the cost  
13 delta between these projects’ deposits and the invoices sent by DEP is related to  
14 actual cost changes and how much is related to allocation of soft costs like  
15 overheads – the methodology and assumptions of which, as I am aware, have yet  
16 to be proposed by Duke or approved by the Commission. Of course, it may also  
17 turn out that the discrepancies that are the subject of the complaints have less to do  
18 with the estimates being “too low” and more to do with lack of cost controls  
19 resulting in “actual costs” that are not commercially reasonable.

20 **Q. DOES DEP’S ESTIMATING METHODOLOGY HAVE IMPLICATIONS**  
21 **FOR RATEPAYERS?**

22 A. Yes.

1 Q. PLEASE EXPLAIN.

2 A. As described in DEP's discovery responses,

3 DEP utilizes the same design and cost estimating process (use of  
4 Maximo and common design standards) for all Distribution  
5 construction projects that is used for estimating costs of construction  
6 upgrades necessary for interconnection of independent generation  
7 (i.e. PURPA qualifying facilities) and DEP's own construction costs  
8 (i.e., for system modifications including for interconnection of  
9 DEP's own generation facilities or for customer addition, reliability  
10 improvement or other system modifications undertaken by DEP).  
11 Specifically, DEP utilizes Maximo for both independent generation  
12 and DEP-owned projects, as further described in the Company's  
13 response to Data Request No. 1-3. However, as described in DEP's  
14 response to Request No. 1-3, DEP has also integrated a generator  
15 interconnection-specific Revised Estimating Tool as part of the  
16 Facilities Study process.

17 DEP Resp. 1-9. DEP further clarified that

18 DEP has used the same methodology to estimate the cost of parts,  
19 labor and overheads for all construction projects (DEP-owned  
20 generation subject to the NC Interconnection Procedures, 3rd party  
21 generation, as well as retail, commercial, industrial and  
22 governmental load customers) since January 1, 2015. Several of the  
23 tools have been changed or modified during that timeframe  
24 including the change of the work management tool from WMIS to  
25 Maximo.

26 DEP Supp. Resp. 1-9. DEP's responses should concern the Commission and  
27 ratepayers generally. While it is independent power producers who suffer when  
28 DEP underestimates, or overestimates, solar interconnection costs—because  
29 interconnection customers make decisions based on estimates but are ultimately  
30 responsible for the actual costs—that is not the case with DEP's own projects,  
31 which end up being passed through to ratepayers. Because DEP presumably uses  
32 its own cost estimates to determine whether a given project represents a prudent



1 capital expense, it seems likely that grid investments made historically by DEP  
2 (and/or DEC) between 2015 and June 2019 and thereafter are at risk of increased  
3 costs without substantiated rationale. It is unclear to me how a regulated utility  
4 could make and receive approval for rate base of any prudent investments without  
5 accurate cost estimates or processes that have been appropriately vetted by  
6 stakeholders and adjudicated by regulators.

7 Of course, there is also the possibility that DEP's "low" estimates are  
8 accurate for its own projects, but inaccurately low for solar developers, for whom  
9 DEP has little incentive to exercise cost controls. Such a discriminatory set of  
10 circumstances—cost controls for DEP, but not for its independent power producing  
11 competitors—would obviously raise other issues of concern to the Commission.

12 **Q. BASED ON YOUR REVIEW OF THE INFORMATION PROVIDED BY**  
13 **DEP IN THIS PROCEEDING, DOES WILLIAMS SOLAR HAVE A BELIEF**  
14 **AS TO WHICH ESTIMATE PROVIDED BY DEP IS A MORE ACCURATE**  
15 **REPRESENTATION OF EXPECTED PROJECT COSTS?**

16 A. As discussed, the SIS estimate appeared to be high but is much closer to Williams  
17 Solar's expectation than the facilities study estimate. This initial belief is further  
18 supported by the revised results of DEP's Maximo analysis at the facilities study  
19 stage, which showed costs slightly lower than initial forecast. *See* Exhibit JB-13 at  
20 pp. 7-8. The two analyses were the only analyses performed by DEP based on  
21 actual cost data. Having reviewed DEP's response to Williams Solar's notice of  
22 dispute, its answer in this proceeding, and its discovery responses, it does not

1 appear that either the SIS estimate or the facilities study estimate was provided in  
2 good faith or based on sound estimating practices but DEP should be held, at the  
3 most, to the results of the initial SIS estimate, which appears to be based on an  
4 actual cost analysis and not intentional manipulation by DEP that does not conform  
5 to good utility practice.

6 **Q. WHAT RELIEF DOES WILLIAMS SOLAR SEEK IN THIS**  
7 **PROCEEDING?**

8 A. Williams Solar seeks whatever relief the Commission may give within its authority,  
9 including (1) a declaration that all estimates must be provided in good faith, which  
10 includes a requirement that any estimate of costs be based on commercially  
11 reasonable actual cost data; (2) a declaration that DEP failed to provide a good faith  
12 cost estimate to Williams Solar, with an accounting of unnecessary costs incurred  
13 by Williams Solar as a result; (3) an order requiring DEP to promptly render a  
14 revised facilities study estimate capped at DEP's initial SIS estimate, adopting a  
15 rebuttable presumption that any actual costs exceeding 110% of the revised  
16 estimate are unreasonable, requiring DEP to provide an executable interconnection  
17 agreement with a projected in-service date within six months after posting of  
18 required funds, and requiring DEP to provide Williams Solar with a standard offer  
19 Power Purchase Agreement subject to preservation of the economic benefits of the  
20 entire 15-year term afforded by HB 589; and (4) enforcement of a penalty against  
21 DEP as allowed by N.C.G.S. § 62-310(a). Williams Solar also asks the  
22 Commission to investigate DEP's cost estimating procedures, especially

1 calculation and application of DEP overheads and contingencies, and supporting  
2 cost data to ensure that DEP is carrying out the Interconnection Procedures in a fair  
3 and nondiscriminatory manner.

4 **Q. DOES THIS COMPLETE YOUR DIRECT TESTIMONY?**

5 A. Yes.

**INDEX OF EXHIBITS**

<b><u>Exhibit No.</u></b>	<b><u>Description</u></b>
<b>JB-1</b>	January 28, 2019 SIS transmittal e-mail
<b>JB-2</b>	Williams Solar System Impact Study
<b>JB-3</b>	Williams Solar Facilities Study Agreement
<b>JB-4</b>	July 30, 2019 facilities study result e-mail
<b>JB-5</b>	<b>[CONFIDENTIAL]</b> Chart of external costs incurred by Williams Solar, LLC
<b>JB-6</b>	July-August 2019 e-mail exchange regarding facilities study results
<b>JB-7</b>	Williams Solar's Notice of Dispute
<b>JB-8</b>	DEP's Response to Notice of Dispute
<b>JB-9</b>	DEP's Responses to Williams Solar's Discovery Requests
<b>JB-10</b>	DEP's Supplemental Responses to Williams Solar's Discovery Requests
<b>JB-11</b>	SIS Estimation Tool Rev1.xlsx
<b>JB-12</b>	Williams Solar Estimation Tool SIS.xlsx
<b>JB-13</b>	DR No. 1-3 Revised Estimating Tool Description - Williams Solar
<b>JB-14</b>	<b>[CONFIDENTIAL]</b> GreenGo Interconnection Cost Update & Tracker presentation

**From:** Winter, Lee P [/O=DUKEENERGY/OU=EXTERNAL (FYDIBOHF25SPDLT)/CN=RECIPIENTS/CN=DB64AAEB15AA4963B4EA05A8F2778430]  
**Sent:** 1/28/2019 11:07:13 AM  
**To:** Flagstad, Frederik -greengoenergy [/o=DukeEnergy/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=Flagstad, Frederik -greengoenergy61e]; Carl Siebing (cs@greengoenergy.com) [cs@greengoenergy.com]; Interconnection US (interconnection@greengoenergy.com) [interconnection@greengoenergy.com]  
**CC:** DERContracts [/o=DukeEnergy/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=DERContractsbb5]  
**Subject:** Interconnection Request Williams Solar, LLC CHKLIST 15007  
**Attachments:** Williams System Impact Study Report with A.pdf; Facility Study Agreement.pdf; Request for Information.docx

The results of the System Impact Study Report for the interconnection costs which do not account for the terrain that DEP personnel will encounter to connect your renewable generation project to the DEP grid. Please be advised that these preliminary costs are based on a grid program, that is used to evaluate the connection to the grid. To that end, these are the baseline costs to connect the facility to the grid based on the proposed route by DEP that should be most cost effective and more easily to secure right-of-way for the project. Please note the project owner will have the option to choose the route of the infrastructure and point-of-delivery (POD) knowing that costs can potentially increase. The purpose of this email is for a decision to be made whether or not to continue moving forward with the project for the final costs or to withdraw.

If you desire to move forward with the project please complete ALL fields of the attached document(s) and return to me. You must complete and return the form(s) to be received within sixty (60) calendar days from the date of this email or your project will be deemed withdrawn.

At this current stage your options are:

- o Continue with the interconnection process by completing and returning the attached documents to be received within sixty (60) calendar days from the date of this email – March 29, 2019; or you can
- o Withdraw by replying to this email

**SYSTEM UPGRADES Assuming NC2016-02927 – Williams Solar, LLC Commits to Installing (Budgetary One Time System Upgrade estimate of \$774,000)**

As a result of a completed feeder study, the following work scope must be designed and cost-estimated (on its own work order) separately:

1. Reconductoring as follows:
  - a) Replace existing 1 - # 2 ACSR circuit with 3-477 AAC circuit from DIS# 2M843 to DIS# 2M845 (approximately 0.0775 miles). The existing neutral should be replaced with a 1/0 AAAC neutral.
  - b) Replace existing 1 - #4 BC circuit with 3-477 AAC circuit from DIS# 2M803 to DIS# 2M843 (approximately 1.342 miles). The existing neutral should be replaced with a 1/0 AAAC neutral.
  - c) Replace existing 3 - #2 ACSR circuit with 3-477 AAC circuit from DIS# 2L653 to DIS# 2M803 (approximately 1.114 miles). The existing neutral should be replaced with a 1/0 AAAC neutral.
2. Sectionalizing/protection changes as follows:
  - a) Remove 25 A Fuse at DIS# 2M803.
  - b) Install 3 x 50 A Fuses at DIS# 2M803.
  - c) Relocate the Hydraulic Recloser at DIS# 2KU54 to 2M725.
  - d) Install a G&W recloser at DIS# 2M725.
  - e) Install 1 x 25 A Fuses at DIS# 2M845.
  - f) Install 3 x 25 A Fuses at DIS# 2M840.
  - g) Install 1 x 25 A Fuses at DIS# 2M827.
  - h) Install 1 x 25 A Fuses at DIS# 2M819.
  - i) Install 1 x 25 A Fuses at DIS# 2M813.

j) Install 71 high fault tamer fuses.

1Ø - 2KJ54	1Ø - 2KW94	1Ø - 2KU91	1Ø - 2M885	1Ø - 2M830	1Ø - 2M813	1Ø - 6BY83
1Ø - 2KJ50	1Ø - 2KW93	1Ø - 2KU89	1Ø - 2M823	1Ø - 9NJ16	1Ø - 2M808	1Ø - 7HA89
1Ø - 2KJ49	1Ø - 2NA05	1Ø - 2KU86	1Ø - 2M822	1Ø - 2M827	1Ø - 2M790	1Ø - 7EQ45
1Ø - 2KJ43	1Ø - 2NA02	1Ø - 15LF06	1Ø - 149A06	1Ø - 6LT98	1Ø - 10AJ02	1Ø - 2L823
1Ø - 2KJ47	1Ø - 2KW98	1Ø - 2KU83	1Ø - 2M841	1Ø - 2M824	1Ø - 2M788	1Ø - 2L759
1Ø - 2KJ42	1Ø - 2KW96	1Ø - 2M903	1Ø - 8NJ03	1Ø - 2M819	1Ø - 2Q991	1Ø - 14DR68
1Ø - 2KG19	1Ø - 2NA16	1Ø - 2M901	1Ø - 8NJ04	1Ø - 2M816	1Ø - 2M793	1Ø - 104E58
1Ø - 2KG24	1Ø - 2NA13	1Ø - 2M898	1Ø - 2M837	1Ø - 6QA58	1Ø - 2M791	1Ø - 2N380
1Ø - 2L971	1Ø - 2KU98	1Ø - 2M897	1Ø - 2M835	1Ø - 15D739	1Ø - 2M782	1Ø - 2L755
1Ø - 2L968	1Ø - 2KU94	1Ø - 2M890	1Ø - 2M831	1Ø - 6QA55	1Ø - 2M780	1Ø - 2L753
1Ø - 2KJ58						

3. Other changes as follows:

- a) Verify that the substation regulator is set to either Ignore Mode or Co-Generation Mode (based on the control type).

There could be as much as 9.292 MW shipped back into the substation during low load periods from the Newton Grove 23 kV feeder.

**Interconnection Facilities (Budgetary Interconnection Facilities estimate \$60,000)**

Interconnection Pole will be 2M845. ( 35.278505, -78.367579)

Install a maximum of 2 spans of 3 - #477 AAC primary and #1/0 AAAC neutral tap from Pole 2M845 to POD. Deviation from this recommendation requires the approval of the local PQR&I representative or the local Distribution Capacity Planner.

POD per Figure 71B (overhead).

Install G&W recloser one pole to Duke Energy Progress side of POD.

Install Power Quality (PQ) Meter per Figure 71B

**“NOTE: The generating facility is to be operated such that unity power factor is continuously maintained at the Point of Delivery (where utility-owned metering is located).”**

Please direct other technical questions to [DEPCustomerOwnedGeneration@duke-energy.com](mailto:DEPCustomerOwnedGeneration@duke-energy.com).

*Lee Winter*

Wholesale Renewable Manager  
Distributed Energy Technology



919-546-2207  
919-219-7445 (mobile)





**Williams Solar, LLC**

**NC2016-02927**

**Proposed Generating Facility  
System Impact Study Report  
Duke Energy Progress (DEP)**

**December 20, 2018**



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## Preface

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The System Impact Study is designed to identify and detail the electric system impacts associated with interconnecting the proposed Generation Facility and to identify System Upgrades and Interconnections Facilities needed to interconnect the facility and correct any system problems identified in the study. The study is based on the point of interconnection proposed by the Interconnection Customer and on technical information provided in the Interconnection Request. In addition to detailing the required Interconnection Facilities and System Upgrades, the study provides a preliminary, non-binding estimate of the cost and length of time necessary to provide the facilities and upgrades.

## Interconnection Data

---

**Interconnection Customer:** Williams Solar, LLC

**Queue Number:** NC2016-02927

**Maximum Physical Export Capability Requested:** 4,992 kW

**Generating Facility Equipment:**

- PV Panels: First Solar FS-4120A-3 – Quantity 56,160
  - o 120 Watt Panels
- Inverters: Fronius Symo 24.0-3 480 – Quantity 208
  - o UL1741 Compliant
  - o Rated Output Power of 24 kW
  - o Nominal Apparent Power of 24 kVA
  - o Operating Voltage: 480 V
- Transformers: 1,700 kVA – Quantity 3
  - o Manufacturer: Not provided
  - o Primary (Utility) Winding: 22.86 kV Wye-grounded
  - o Secondary (Inverter) Winding: 480 V Wye-grounded
  - o 5.75% Impedance

## Circuit Information

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**Substation Name:** Newton Grove 230 kV

**Feeder Number:** Newton Grove 23 kV

**Point of Interconnection (POI):** 35.278505, -78.367579

**Nominal Voltage:** 22.86 kV

**Existing/Proposed Generating Facilities Ahead On Feeder:**

Queue Number	Size of Generating Facility (kW)
IC13-138	1,980
NC2016-02911	5,000

**Existing/Proposed Generating Facilities Ahead On Substation:**

Queue Number	Size of Generating Facility (kW)
IC13-017	4,872
IC13-138	1,980
NC2016-02911	5,000

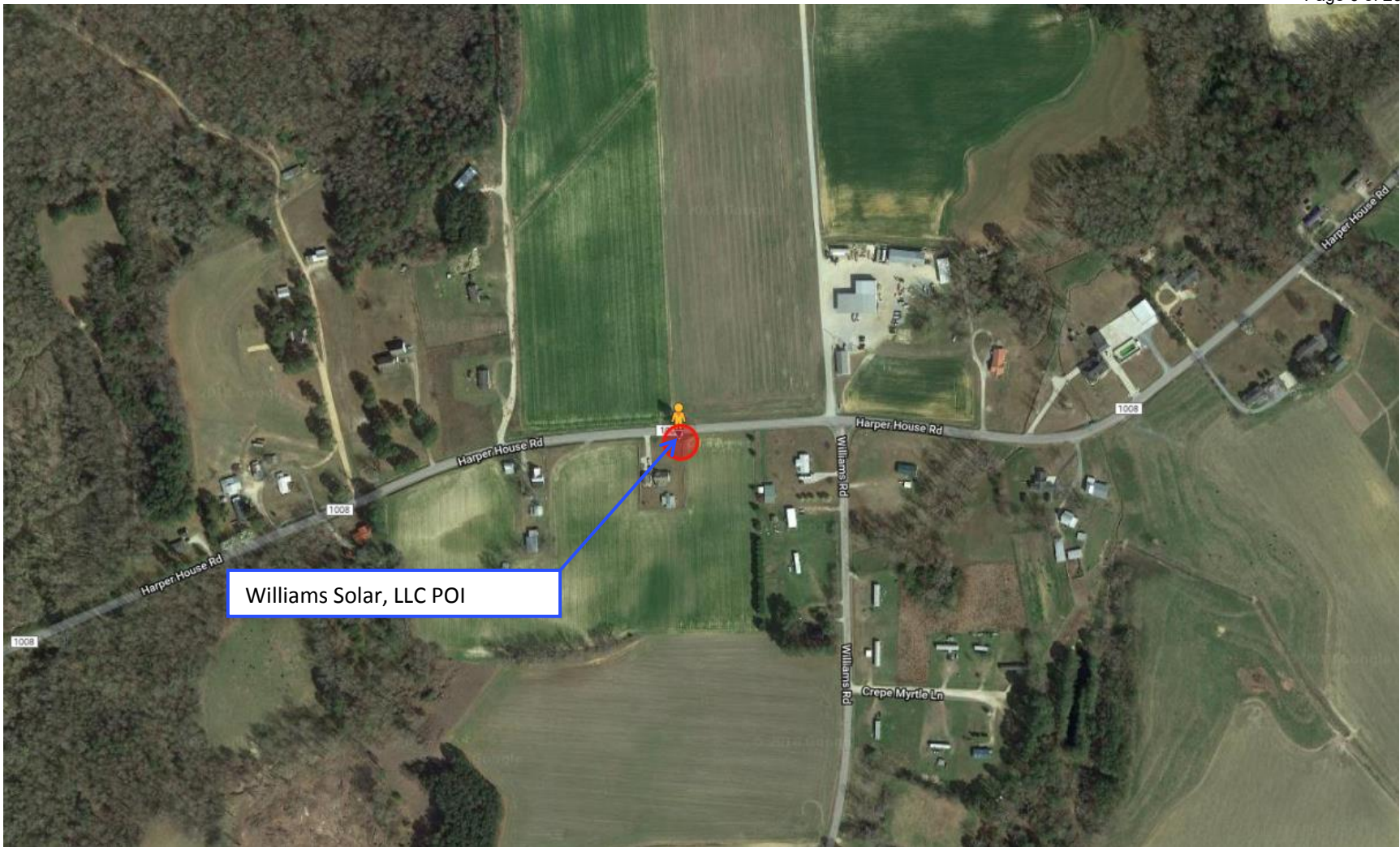


Figure 1 - Point Of Interconnection

## **Distributed Energy Resource Planning & Interconnection Guidelines**

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The Generating Facility was reviewed in conjunction with the DEC & DEP: Distributed Energy Resource (DER) Method Of Service Guidelines for DER No Larger Than 20 MW (“Guidelines”) to determine the applicable path for interconnection. A link to the Guidelines is provided below.

<https://www.duke-energy.com/business/products/renewables/generate-your-own>

As determined by the design of the Generating Facility and the Maximum Physical Export Capability Requested on the Interconnection Request, the Interconnection Customer will interconnect to the DEP system as Method “D”, as defined in Section 2.2 of the Guidelines.

The Interconnection Customer’s POI is within the first regulated zone of the DEP distribution system. As such, no new line extensions were required in order to accommodate the Interconnection Customer. As such, the POI for this installation will be at the end of the interconnection facilities. The interconnection facilities will be located on the Interconnection Customer’s property.

The short circuit capability at the POI is 98.4 MVA. The short circuit capability at the substation bus is 152.1 MVA. Generating Facilities currently exist ahead of the Interconnection Customer in the queue, totaling 11.852 MW. This equates to the Interconnection Customer having a Stiffness Factor of 19.7 and 9.0 at the POI and substation bus, respectively. The Interconnection Customer fails the POI Stiffness Factor and the Substation Stiffness Factor, as defined in Section 3.4 of the Guidelines.

The Generating Facility consists of a large amount of transformer capacity that needs to be energized by the DEP distribution system. In order to address the potential impacts to system safety, reliability and power quality, a study to determine the transient impacts of transformer energization was required. This analysis addressed the potential risk of excessive harmonics and rapid voltage change seen on the distribution system caused by energizing the Generating Facility’s transformers. The results of which are detailed in a later section.

## **Transformer Inrush Study**

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A study was performed to investigate transient impacts of transformer energization. To remediate issues identified within the study, the Generating Facility will utilize a 150 Ohm pre-insertion resistor. There were no further changes required to the Generating Facility's design.

## Circuit Breaker Short Circuit Capability Limits

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The POI is electrically downstream of non-electronic protective devices (i.e. fuses, or hydraulic reclosers). The protective scheme of the circuit needed to be altered such that only electronic devices exist upstream of the Interconnection Customer's POI while maintaining the reliability for DEP retail customers. These alterations include, but are not limited to, replacing devices with electronic reclosers and installing/relocating devices. A detailed listing of the System Upgrades that satisfied these requirements can be found in the Results Section below. The Interconnection Customer will be responsible for these System Upgrades.

The addition of the Generating Facility causes service transformers to be added to the high fault area. Service transformers within this area are retrofitted with current limiting fuses to minimize the chance of tank ruptures. In order to remediate these issues, the Interconnection Customer will be responsible for retrofitting the following transformers to incorporate current limiting fuses, also known as High Fault Tamers.

Transformer ID	Phase	LLL (A)	LLG (A)	LL (A)	LG (A)
2KJ58	1Ø	0	0	0	1904
2KJ54	1Ø	0	0	0	1949
2KJ43	1Ø	0	0	0	2029
2KJ47	1Ø	0	0	0	1970
2KG19	1Ø	0	0	0	1965
2KG28	1Ø	0	0	0	1901
2KG24	1Ø	0	0	0	1993
2L972	1Ø	0	0	0	1907
2L971	1Ø	0	0	0	1929
2L968	1Ø	0	0	0	1971
2KW94	1Ø	0	0	0	2023
2NA08	1Ø	0	0	0	1915
2NA05	1Ø	0	0	0	1949
2NA02	1Ø	0	0	0	1977
2KW98	1Ø	0	0	0	2016
2NA16	1Ø	0	0	0	1986
2NA13	1Ø	0	0	0	2007
2KU98	1Ø	0	0	0	1930
2KU94	1Ø	0	0	0	1951
2KU91	1Ø	0	0	0	1974
2KU89	1Ø	0	0	0	1993
2KU86	1Ø	0	0	0	2018
15LF06	1Ø	0	0	0	2091
2KU83	1Ø	0	0	0	2114
2M903	1Ø	0	0	0	1927
2M901	1Ø	0	0	0	1955



2M898	1Ø	0	0	0	1998
2M897	1Ø	0	0	0	1994
2M890	1Ø	0	0	0	2202
2M823	1Ø	0	0	0	2103
2M822	1Ø	0	0	0	2132
2M843	1Ø	0	0	0	1917
149A06	1Ø	0	0	0	1935
2M841	1Ø	0	0	0	1944
8NJ03	1Ø	0	0	0	1942
8NJ04	1Ø	0	0	0	1926
2M837	1Ø	0	0	0	1990
2M835	1Ø	0	0	0	2017
2M831	1Ø	0	0	0	2046
2M830	1Ø	0	0	0	2067
9NJ16	1Ø	0	0	0	2059
2M827	1Ø	0	0	0	2089
6LT98	1Ø	0	0	0	2100
2M824	1Ø	0	0	0	2138
2M819	1Ø	0	0	0	2171
2M816	1Ø	0	0	0	2237
6QA58	1Ø	0	0	0	2179
15D739	1Ø	0	0	0	2187
6QA55	1Ø	0	0	0	2241
2M813	1Ø	0	0	0	2283
2M808	1Ø	0	0	0	2331
2M790	1Ø	0	0	0	2077
10AJ02	1Ø	0	0	0	2097
2M788	1Ø	0	0	0	2124
2Q991	1Ø	0	0	0	1931
2M793	1Ø	0	0	0	1989
2M791	1Ø	0	0	0	2072
2M782	1Ø	0	0	0	2174
2M780	1Ø	0	0	0	2237
7EQ13	1Ø	0	0	0	1920
7HA89	1Ø	0	0	0	1963
7EQ45	1Ø	0	0	0	1993
2L823	1Ø	0	0	0	2028
2L772	1Ø	0	0	0	1917
2L761	1Ø	0	0	0	1917
2L759	1Ø	0	0	0	1930
14DR68	1Ø	0	0	0	1948
104E58	1Ø	0	0	0	1930
2N380	1Ø	0	0	0	1951
2L755	1Ø	0	0	0	1970
2L753	1Ø	0	0	0	2030

Table 1 – High Fault Area Violations

A detailed listing of these System Upgrades can be found in the Results section below.

## Thermal Overload Or Voltage Limit Violations

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The Interconnection Customer's POI is on a single phase line. The Interconnection Customer will be responsible for rebuilding 1.4195 miles of line from single phase to three phase in order to accommodate the Generating Facility. A detailed listing of these System Upgrades can be found in the Results section below.

The interconnection of a Generating Facility shall not cause the service voltage to exceed DEP's distribution voltage standards. Additionally, the interconnection of a Generating Facility shall not cause the voltage change to exceed the limits defined in the document entitled RVC (Rapid Voltage Change) and Flicker Study Criteria ("Flicker"), attached in the Appendix at the end of this report. After evaluating the addition of the Generating Facility at the requested size of 4,992 kW, it was determined that there are no service voltage and Flicker violations.

The results of the evaluations are detailed in the Tables below. The "Retail Customer" refers to the location of a DEP retail customer who has the potential to experience the greatest effect with the addition of the Generating Facility. The Retail Customer may not refer to the same location between peak and valley circuit loading conditions. The "Substation" location refers to the regulated side of the substation. The voltages are presented on a 120V base and represent the medium voltage (primary) level.

Location	V <sub>A</sub>	V <sub>B</sub>	V <sub>C</sub>	RVC Criteria "A"	RVC Criteria "B"
Retail Customer	123.9 – Pass	124.2 – Pass	124.4 – Pass	1.01% - Pass	1.66% - Pass
Retail Customer	124.6 – Pass	124.1 – Pass	124.8 – Pass	0.32% - Pass	0.98% - Pass
POI	123.9 – Pass	124.2 – Pass	124.4 – Pass	1.01% - Pass	1.66% - Pass
Substation	123.2 – Pass	124.1 – Pass	124.1 – Pass	0.32% - Pass	0.98% - Pass

Table 2 - Voltage Limit Results – Peak Circuit Loading with Existing Infrastructure

Location	V <sub>A</sub>	V <sub>B</sub>	V <sub>C</sub>	RVC Criteria "A"	RVC Criteria "B"
Retail Customer	-	-	124.1 – Pass	0.60% – Pass	0.77% – Pass
Retail Customer	123.9 – Pass	124.2 – Pass	124.0 – Pass	0.07% – Pass	0.11% – Pass
POI	124.3 – Pass	124.4 – Pass	124.1 – Pass	0.60% – Pass	0.77% – Pass
Substation	123.5 – Pass	123.9 – Pass	123.4 – Pass	0.07% – Pass	0.11% – Pass

Table 3 - Voltage Limit Results – Valley Circuit Loading with Existing Infrastructure

The addition of the Generating Facility creates annealing violations for conductors on the existing DEP distribution system. Annealing is a change in the molecular structure of a metal conductor, thereby changing the conductor's physical and electrical properties; i.e. a decrease in tensile strength, thereby affecting sagging. In order to remediate the violations caused by the addition of the Generating Facility, the Interconnection Customer will be responsible for upgrades to correct these affected conductors. A detailed list of these System Upgrades can be found in the Results section below.

The existing 20 MVA substation transformer can adequately support the Interconnection Customer and the 11,852 kW aggregate Generating Facilities queued ahead of this project.

## Grounding Requirements And Electric System Protection

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The Generating Facility will supply transformers connected in the Wye-grounded (utility) / Wye-grounded (inverter) configuration. This configuration is acceptable for interconnection to the DEP system.

The interconnection facilities for the Generating Facility will be as per Figure 71B of the Requirements for Electric Service and Meter Installations manual, link provided below.

[https://www.duke-energy.com/\\_/media/pdfs/partner-with-us/service-requirements-manual.pdf](https://www.duke-energy.com/_/media/pdfs/partner-with-us/service-requirements-manual.pdf)

The requirements for the Generating Facility are as follows, as per Figure 75C:

- a) Interconnection protection will be owned and operated by DEP and is to include a recloser, relaying (control), and remote communications for monitoring and operations.
  - i. Protection will utilize over current, under/over voltage, and under/over frequency relaying.
- b) DEP shall provide a manual load-break rated disconnect switch to serve as a clear visible indication of switch position between the utility and the Interconnection Customer. The switch must be readily accessible to DEP personnel.
- c) Interconnection Customer's inverters have to be tested and listed for compliance with the latest published edition of Underwriter Laboratories Inc., UL 1741 for utility interactive inverters.
- d) Interconnection Customer shall comply with the latest edition of IEEE 1547 and applicable series standards.

These requirements and the interconnection Figure are subject to change at any time.

A power quality (PQ) meter will also be installed with the interconnection facilities to continuously monitor the power quality impacts of the generating facility to the DEP system.

The Generating Facility is to be operated such that unity power factor is continuously maintained at the Point of Interconnection (where utility-owned metering is located).



## Results

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As a result of the interconnection of the Generating Facility, the System Upgrades detailed above will be required at the responsibility of the Interconnection Customer. A more in depth listing of these System Upgrades is detailed below.

1. Transmission Upgrades:
  - a. None.
2. Substation Upgrades:
  - a. None.
3. New Line Construction/Reconductoring:
  - a. Replace existing 1 - # 2 ACSR circuit with 3-477 AAC circuit from DIS# 2M845 to DIS# 2M843 (approximately 0.0775 miles). The existing neutral should be replaced with a 1/0 AAAC neutral.
  - b. Replace existing 1 - #4 BC circuit with 3-477 AAC circuit from DIS# 2M843 to DIS# 2M803 (approximately 1.342 miles). The existing neutral should be replaced with a 1/0 AAAC neutral.
  - c. Replace existing 3 - #2 ACSR circuit with 3-477 AAC circuit from DIS# 2M803 to DIS# 2L653 (approximately 1.114 miles). The existing neutral should be replaced with a 1/0 AAAC neutral.
4. Protection Upgrades/Sectionalization:
  - a. Remove 25 A Fuse at DIS# 2M803.
  - b. Install 3 x 50 A Fuses at DIS# 2M803.
  - c. Relocate the Hydraulic Recloser at DIS# 2KU54 to 2M725.
  - d. Install a G&W recloser at DIS# 2M725.
  - e. Install 1 x 25 A Fuses at DIS# 2M845.
  - f. Install 3 x 25 A Fuses at DIS# 2M840.
  - g. Install 1 x 25 A Fuses at DIS# 2M827.
  - h. Install 1 x 25 A Fuses at DIS# 2M819.
  - i. Install 1 x 25 A Fuses at DIS# 2M813.
  - j. Install 71 high fault tamer fuses.

1Ø - 2KJ54	1Ø - 2KW94	1Ø - 2KU91	1Ø - 2M885	1Ø - 2M830	1Ø - 2M813	1Ø - 6BY83
1Ø - 2KJ50	1Ø - 2KW93	1Ø - 2KU89	1Ø - 2M823	1Ø - 9NJ16	1Ø - 2M808	1Ø - 7HA89
1Ø - 2KJ49	1Ø - 2NA05	1Ø - 2KU86	1Ø - 2M822	1Ø - 2M827	1Ø - 2M790	1Ø - 7EQ45
1Ø - 2KJ43	1Ø - 2NA02	1Ø - 15LF06	1Ø - 149A06	1Ø - 6LT98	1Ø - 10AJ02	1Ø - 2L823
1Ø - 2KJ47	1Ø - 2KW98	1Ø - 2KU83	1Ø - 2M841	1Ø - 2M824	1Ø - 2M788	1Ø - 2L759
1Ø - 2KJ42	1Ø - 2KW96	1Ø - 2M903	1Ø - 8NJ03	1Ø - 2M819	1Ø - 2Q991	1Ø - 14DR68
1Ø - 2KG19	1Ø - 2NA16	1Ø - 2M901	1Ø - 8NJ04	1Ø - 2M816	1Ø - 2M793	1Ø - 104E58
1Ø - 2KG24	1Ø - 2NA13	1Ø - 2M898	1Ø - 2M837	1Ø - 6QA58	1Ø - 2M791	1Ø - 2N380
1Ø - 2L971	1Ø - 2KU98	1Ø - 2M897	1Ø - 2M835	1Ø - 15D739	1Ø - 2M782	1Ø - 2L755
1Ø - 2L968	1Ø - 2KU94	1Ø - 2M890	1Ø - 2M831	1Ø - 6QA55	1Ø - 2M780	1Ø - 2L753
1Ø - 2KJ58						

5. Other:
  - a. None.
6. Interconnection Facilities:

- a. Standard Interconnection Package connected as per Figure 71B.

The budgetary Interconnection Facilities estimate is \$60,000. The budgetary One-Time estimate for the required System Upgrades is \$774,000. These estimates are non-binding and are detailed in the Table below. Additionally, these estimates are only for the work required on the utility side of the POI.

	Cost
Transmission Upgrades	\$0
Substation Upgrades	\$0
New Line Construction/Reconductoring	\$705,000
Protection Upgrades/Sectionalization	\$69,000
Other	\$0
<b>Total Upfront Charges</b>	<b>\$774,000</b>

Table 4 - One-Time System Upgrades estimate



## Appendix

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## 1 RVC (rapid voltage change) and flicker study criteria

Note: Effective January 4, 2018

This RVC & flicker criteria is termed as “DEC & DEP RVC & flicker version 3”.

### 1.1 RVC criteria “A”: 3% $\Delta V$ check for single DER shutdown

The study will evaluate the effect of a single DER shutdown, with the voltage change being evaluated anywhere on the circuit to assure a change of no greater than 3%.

### 1.2 RVC criteria “B”: 4% $\Delta V$ check for aggregate DER shutdown on circuit

The study will evaluate the effect of a shutdown of all DER on a circuit; this partially simulates the impact of a circuit trip and reclose event and the resulting voltage change across the circuit, comparing pre-fault & trip voltage with voltage after circuit restoration (and all DER on circuit offline). The voltage change will be evaluated anywhere on the circuit to assure a change of no greater than 4%.

### 1.3 RVC criteria “C”: 1.5% $\Delta V$ check at voltage regulators, for single DER output drop of 75%

The study will evaluate the effect of a 75% drop in DER output to assure that voltage does not change more than 1.5% at any voltage regulator locations. For ease of evaluation, a 100% drop will be evaluated against a 2% change at any voltage regulator locations (assumed to be mathematically equivalent to the 75%/1.5% criteria).

### 1.4 RVC criteria “D”: 3% $\Delta V$ check for transformer energization voltage sag

When using appropriate modeling techniques (e.g. PSCAD), the study will evaluate the effect of a transformer magnetization, with the voltage change being evaluated anywhere on the circuit to assure a change of no greater than 3%. Right now this is recommended for all facilities 1 MW and larger.

### 1.5 Flicker criteria

No specific evaluation will be performed, as it is Duke’s estimation that the RVC requirements should suffice at this time. The DER operator will be liable for correcting any retail customer power quality problems attributed to intermittent output. As PQ meters become more prevalent, Duke will consider the use of IEEE 1547-2018 and IEEE 1453, through monitoring Pst and Plt values.

## 2 Revision history

Revision	Date	Comments
1.0	9/13/2017	Initial release
1.1	9/19/2017	Effective date changed
1.2	1/8/2018	Addition of Maximum allowable step voltage changes criteria



## ATTACHMENT 8

**Facilities Study Agreement**

**THIS AGREEMENT** ("Agreement") is made and entered into this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_ by and between Williams Solar, LLC, a limited liability company organized and existing under the laws of the State of North Carolina, ("Interconnection Customer,") and, Duke Energy Progress, LLC, a limited liability company existing under the laws of the State of North Carolina, ("Utility"). The Interconnection Customer and the Utility each may be referred to as a "Party," or collectively as the "Parties."

**RECITALS**

**WHEREAS**, the Interconnection Customer is proposing to develop a Generating Facility or generating capacity in addition to an existing Generating Facility consistent with the Interconnection Request Application Form completed by the Interconnection Customer, dated June 4th, 2018 and received by the Utility on June 5th, 2018; and the single-line drawing provided by the Interconnection Customer, dated November 11th, 2018 and received by the Utility on November 14th, 2018 and

**WHEREAS**, the Interconnection Customer desires to interconnect the Generating Facility with the Utility's System; and

**WHEREAS**, the Utility has completed a System Impact Study and provided the results of said study to the Interconnection Customer (this recital to be omitted if the Parties have agreed to forego the system impact study); and

**WHEREAS**, the Interconnection Customer has requested the Utility to perform a Facilities Study to specify and estimate the cost of the equipment, engineering, procurement and construction work needed to implement the conclusions of the system impact study and/or any other relevant studies in accordance with Good Utility Practice to physically and electrically connect the Generating Facility with the Utility's System;

**NOW, THEREFORE**, in consideration of and subject to the mutual covenants contained herein the Parties agree as follows:

1. When used in this Agreement, with initial capitalization, the terms specified shall have the meanings indicated or the meanings specified in the North Carolina Interconnection Procedures.
2. The Interconnection Customer elects and the Utility shall cause to be performed a facilities study consistent with the North Carolina Interconnection Procedures.
3. The scope of the facilities study shall be subject to data provided in Appendix A to this Agreement.

4. The facilities study shall specify and estimate the cost of the equipment, engineering, procurement and construction work (including overheads) needed to implement the conclusions of the system impact studies. The facilities study shall also identify (1) the electrical switching configuration of the equipment, including, without limitation, transformer, switchgear, meters, and other station equipment, (2) the nature and estimated cost of the Utility's Interconnection Facilities and Upgrades necessary to accomplish the interconnection, and (3) an estimate of the construction time required to complete the installation of such facilities.

If the study is for a Project B, the study shall assume the interdependent Project A is interconnected.

5. The Utility may propose to group facilities required for more than one Interconnection Customer in order to minimize facilities costs through economies of scale, but any Interconnection Customer may require the installation of facilities required for its own Generating Facility if it is willing to pay the costs of those facilities
6. A deposit of the good faith estimated facilities study cost is required from the Interconnection Customer. If the unexpended portion of the Interconnection Request deposit made for the Interconnection Request exceeds the estimated cost of the facilities study, no payment will be required of the Interconnection Customer.
7. In cases where Upgrades are required, the facilities study must be completed within 45 Business Days of the Utility's receipt of this Agreement, or completion of the Facilities Study for an Interdependent Project A whichever is later. In cases where no Upgrades are necessary, and the required facilities are limited to Interconnection Facilities, the facilities study must be completed within 30 Business Days. The period of time for the Utility to complete the Facilities Study shall be tolled during any period that the Utility has requested information in writing from the Interconnection Customer necessary to complete the Study and such request is outstanding.
8. Once the facilities study is completed, a facilities study report shall be prepared and transmitted to the Interconnection Customer.
9. Any study fees shall be based on the Utility's actual costs and will be deducted from the Interconnection Request deposit made by the Interconnection Customer at the time of the Interconnection Request. After the study is completed the Utility shall deliver a summary of professional time.
10. The Interconnection Customer must pay any study costs that exceed the Interconnection Request deposit without interest within 20 Business Days

of receipt of the invoice. If the unexpended portion of the Interconnection Request deposit exceeds the invoiced fees and the Interconnection Customer withdraws the Interconnection Request, the Utility shall make refund to the Customer pursuant to Section 6.3 of the North Carolina Interconnection Procedures.

11. Governing Law, Regulatory Authority, and Rules

The validity, interpretation and enforcement of this Agreement and each of its provisions shall be governed by the laws of the State of North Carolina, without regard to its conflicts of law principles. This Agreement is subject to all Applicable Laws and Regulations. Each Party expressly reserves the right to seek changes in, appeal, or otherwise contest any laws, orders, or regulations of a Governmental Authority.

12. Amendment

The Parties may amend this Agreement by a written instrument duly executed by both Parties.

13. No Third-Party Beneficiaries

This Agreement is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations herein assumed are solely for the use and benefit of the Parties, their successors in interest and where permitted, their assigns.

14. Waiver

The failure of a Party to this Agreement to insist, on any occasion, upon strict performance of any provision of this Agreement will not be considered a waiver of any obligation, right, or duty of, or imposed upon, such Party.

Any waiver at any time by either Party of its rights with respect to this Agreement shall not be deemed a continuing waiver or a waiver with respect to any other failure to comply with any other obligation, right, duty of this Agreement. Termination or default of this Agreement for any reason by Interconnection Customer shall not constitute a waiver of the Interconnection Customer's legal rights to obtain an interconnection from the Utility. Any waiver of this Agreement shall, if requested, be provided in writing.

15. Multiple Counterparts

This Agreement may be executed in two or more counterparts, each of which is deemed an original but all constitute one and the same instrument.

16. No Partnership

This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties or to impose any partnership obligation or partnership liability upon either Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

17. Severability

If any provision or portion of this Agreement shall for any reason be held or adjudged to be invalid or illegal or unenforceable by any court of competent jurisdiction or other Governmental Authority, (1) such portion or provision shall be deemed separate and independent, (2) the Parties shall negotiate in good faith to restore insofar as practicable the benefits to each Party that were affected by such ruling, and (3) the remainder of this Agreement shall remain in full force and effect.

18. Subcontractors

Nothing in this Agreement shall prevent a Party from utilizing the services of any subcontractor as it deems appropriate to perform its obligations under this Agreement; provided, however, that each Party shall require its subcontractors to comply with all applicable terms and conditions of this Agreement in providing such services and each Party shall remain primarily liable to the other Party for the performance of such subcontractor.

The creation of any subcontract relationship shall not relieve the hiring Party of any of its obligations under this Agreement. The hiring Party shall be fully responsible to the other Party for the acts or omissions of any subcontractor the hiring Party hires as if no subcontract had been made; provided, however, that in no event shall the Utility be liable for the actions or inactions of the Interconnection Customer or its subcontractors with respect to obligations of the Interconnection Customer under this Agreement. Any applicable obligation imposed by this Agreement upon the hiring Party shall be equally binding upon, and shall be construed as having application to, any subcontractor of such Party.

The obligations under this article will not be limited in any way by any limitation of subcontractor's insurance.

19. Reservation of Rights




The Utility shall have the right to make a unilateral filing with the Commission to modify this Agreement with respect to any rates, terms and conditions, charges, or classifications of service, and the Interconnection Customer shall have the right to make a unilateral filing with the Commission to modify this Agreement; provided that each Party shall have the right to protest any such filing by the other Party and to participate fully in any proceeding before the Commission in which such modifications may be considered. Nothing in this Agreement shall limit the rights of the Parties except to the extent that the Parties otherwise agree as provided herein.

**IN WITNESS WHEREOF**, the Parties have caused this Agreement to be duly executed by their duly authorized officers or agents on the day and year first above written.

For the Utility

Name: \_\_\_\_\_  
Print Name: Jeffrey W. Riggins  
Title: Director, DET Interconnects and Standard PPAs  
Date \_\_\_\_\_

For the Interconnection Customer

Name:  \_\_\_\_\_  
Print Name: Frederik Flagstad  
Title: Authorized Agent  
Date February 22, 2019

Facilities Study Agreement  
Appendix A

**Data to Be Provided by the Interconnection Customer with the Facilities Study Agreement**

Provide location plan and simplified one-line diagram of the plant and station facilities. For staged projects, please indicate future generation, circuits, etc.

On the one-line diagram, indicate the generation capacity attached at each metering location. (Maximum load on CT/PT)

On the one-line diagram, indicate the location of auxiliary power. (Minimum load on CT/PT) Amps

One set of metering is required for each generation connection to the new ring bus or existing Utility station. Number of generation connections: one (1)

\_\_\_\_\_

Will an alternate source of auxiliary power be available during CT/PT maintenance?

Yes \_\_\_\_\_ No X \_\_\_\_\_

Will a transfer bus on the generation side of the metering require that each meter set be designed for the total plant generation? Yes \_\_\_\_\_ No X (only 1 meter)

(Please indicate on the one-line diagram).

What type of control system or PLC will be located at the Generating Facility?

SCADA System (First Solar DG SCADA System)

\_\_\_\_\_

What protocol does the control system or PLC use?

Modbus TCP and Modbus RS486

\_\_\_\_\_

Please provide a 7.5-minute quadrangle map of the site. Indicate the plant, station, distribution line, and property lines.

Physical dimensions of the proposed interconnection station:

\_\_\_\_\_

Bus length from generation to interconnection station:

not applicable (DG)

---

Line length from interconnection station to Utility's System.

not applicable (DG)

---

Tower number observed in the field (Painted on tower leg)\*:

---

Number of third party easements required for lines\*:

---

\* To be completed in coordination with Utility.

Is the Generating Facility located in Utility's service area?

Yes  No  If No, please provide name of local provider:

---

Please provide the following proposed schedule dates:

Begin Construction	Date: <u>July 22nd, 2019</u>
Generator step-up transformers receive back feed power	Date: <u>August 19th, 2019</u>
Generation Testing	Date: <u>August 23rd, 2019</u>
Commercial Operation	Date: <u>September 23rd, 2019</u>



**From:** Winter, Lee P [/O=DUKEENERGY/OU=EXTERNAL  
(FYDIBOHF25SPDLT)/CN=RECIPIENTS/CN=DB64AAEB15AA4963B4EA05A8F2778430]  
**Sent:** 7/30/2019 1:05:11 PM  
**To:** Flagstad, Frederik -greengoenergy [/o=DukeEnergy/ou=Exchange Administrative Group  
(FYDIBOHF23SPDLT)/cn=Recipients/cn=Flagstad, Frederik -greengoenergy61e]  
**CC:** DERContracts [/o=DukeEnergy/ou=Exchange Administrative Group  
(FYDIBOHF23SPDLT)/cn=Recipients/cn=DERContractsbb5]  
**Subject:** Facility Study Report, Williams Solar, LLC CHKLIST

**Dear Williams Solar,**

The Interconnection Facilities and System Upgrades (the Facility Study) design and cost estimation for Williams Solar, LLC is complete. Per North Carolina Interconnection Procedures (NCIP) Section 5.1, at this time, you have the option to request a Construction Planning Meeting within 10 business days of receiving this Facility Study Report. If you wish to proceed with this meeting, please submit your request in writing.

The estimated installed cost of the *System Upgrades* is **\$1,388,374.26** (amount includes the North Carolina Sales Tax of 7%).

The estimated *Interconnection Facilities* costs for this project are **\$196,495.13**. This total is comprised of three costs subject to the North Carolina Sales Tax of 7%, and one cost that is not subject to this tax. The following three costs are subject to the North Carolina Sales Tax of 7%: an estimated construction cost of **\$116,419.10**, an estimated metering cost of **\$24,791.30**, and an overhead (processing, technology, oversight, and management) cost of **\$20,000.00**. With tax included, the total of these three costs amounts to **\$151,095.13**. The final cost accounted for in the total estimated Interconnection Facilities costs is an estimated commissioning cost of **\$24,000.00**. This cost is not subject to the North Carolina Sales Tax of 7%.

Upon receipt of an Interconnection Agreement (IA) for execution, you must elect to begin paying Interconnection Facilities costs by either a Contributory Plan or a Non-contributory Plan.

- If a Contributory Plan is elected, you will pay DEP a single up-front payment equal to **\$196,495.13**. You will also pay to Utility a Monthly Facilities Charge of **\$564.84** (0.4% of the estimated installed cost of **\$141,210.40** = estimated construction cost + estimated metering cost).
- If a Non-contributory Plan is elected, you must establish financial security arrangements for the initial term of this agreement. Additionally, you agree to maintain an irrevocable letter of credit in the amount of **\$151,095.13** for the full term of the initial contract period. You will pay overhead and commissioning costs upfront of **\$45,400.00**. You will also pay to Utility a Monthly Facilities Charge of **\$1,412.10** (1.0 % of the estimated installed cost of **\$141,210.40** = estimated construction cost + estimated metering cost).

All estimated costs are subject to being trued-up to actuals after construction, and the IA amended.

Next Steps:

1. Within 10 business days, please provide your requested in-service date for Duke facilities to be in place and operational. If this request date cannot be accommodated, we will advise you of the earliest possible date.

2. At the same time you send the requested in-service date, please provide a response indicating whether or not you would like to request a Construction Planning Meeting.
- a) If you do not request a Construction Planning Meeting, we will tender an executable IA within 15 business days after receipt of your requested in-service date.
  - b) If you do request a Construction Planning Meeting, we will schedule the meeting as soon as a mutually agreeable date is determined. We will not be able to tender an IA until after the occurrence of the Construction Planning Meeting, at such time it would be delivered within 15 business days after the Construction Planning Meeting.

*Lee Winter*

Wholesale Renewable Manager  
Distributed Energy Technology



919-546-2207  
919-219-7445 (mobile)



**Costs Incurred by Williams Solar, LLC**

CONFIDENTIAL







**From:** Interconnection [interconnection@greengoenergy.com]  
**Sent:** 8/16/2019 2:10:31 PM  
**To:** Interconnection [interconnection@greengoenergy.com]  
**CC:** Winter, Lee P [/o=DukeEnergy/ou=External (FYDIBOHF25SPDLT)/cn=Recipients/cn=db64aaeb15aa4963b4ea05a8f2778430]; DERContracts [/o=DukeEnergy/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=DERContractsbb5]; Flagstad, Frederik -greengoenergy [/o=DukeEnergy/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=Flagstad, Frederik -greengoenergy61e]  
**Subject:** Re: Facility Study Report, Williams Solar, LLC CHKLIST

Hi Lee,

Can you please provide some availability for a construction planning meeting? We are eager to move forward.

-Chrissy

On Wed, Aug 14, 2019 at 2:36 PM Interconnection <[interconnection@greengoenergy.com](mailto:interconnection@greengoenergy.com)> wrote:  
Hi Lee,

*Re: Williams Solar, LLC - NC2016-02927*

Just wanted to circle back on the construction planning meeting and see if we could move forward with scheduling that.

-Chrissy

On Wed, Jul 31, 2019 at 4:35 PM Winter, Lee P <[Lee.Winter@duke-energy.com](mailto:Lee.Winter@duke-energy.com)> wrote:

Fred,

Receipt confirmed. Please see responses below in **RED**. We will be in touch shortly to schedule the construction planning meeting.

*Lee Winter*

Wholesale Renewable Manager

Distributed Energy Technology



919-546-2207

919-219-7445 (mobile)

---

**From:** Interconnection [mailto:[interconnection@greengoenergy.com](mailto:interconnection@greengoenergy.com)]  
**Sent:** Tuesday, July 30, 2019 2:52 PM  
**To:** Winter, Lee P <[Lee.Winter@duke-energy.com](mailto:Lee.Winter@duke-energy.com)>; DERContracts <[DERContracts@duke-energy.com](mailto:DERContracts@duke-energy.com)>  
**Cc:** Flagstad, Frederik -greengoenergy <[frederik@greengoenergy.com](mailto:frederik@greengoenergy.com)>; Interconnection US <[interconnection@greengoenergy.com](mailto:interconnection@greengoenergy.com)>  
**Subject:** Re: Facility Study Report, Williams Solar, LLC CHKLIST

**\*\*\* Exercise caution. This is an EXTERNAL email. DO NOT open attachments or click links from unknown senders or unexpected email. \*\*\***

Hi Lee and DERContracts,

*Re: Williams Solar, LLC - NC2016-02927*

Foremost, thank you for sending through the email noting that the Facility Study process has been completed.

FS - We note that the costs indicated by your email are as follows:

- System Upgrades is \$1,388,374.26 (incl. tax)
- Interconnection Facilities costs for this project are \$196,495.13 (incl. applicable tax)
- **Total Costs:** \$1,584,869.39

SIS - This amount is substantially higher than that of the System Impact Study, which resulted in:

- System Upgrades is \$774,000.00 (+ tax)
- Interconnection Facilities costs for this project are \$60,000.00 (+ applicable tax)
- **Total Costs:** \$834,000.00

This is a **90% (\$750,869.34)** increase compared to the very detailed scope and calculation provided at the SIS stage.

Given the extreme departure from the System Impact Study on the part of the Facility Study, we request a detailed overview of the costs associated with this Interconnection Request.

**Request 1:**

Please provide an updated Table 4 (from SIS) cost estimate for the FS, by filling of the 'Costs FS' section highlighted in yellow below:

Table 4 - Cost Overview	Costs SIS	Costs FS
Transmission Upgrades	\$0	
Substation Upgrades	\$0	
New Line Construction/Reconductoring	\$705,000	\$1,181,873.33
Protection Upgrades/Sectionalization	\$69,000	\$115,672.71
Other	\$0	
Total Upfront Charges	\$774,000	\$1,297,546.04

Further, we ask that you provide a detailed cost break down of every item in the SOW so that we can understand what exactly is driving this substantial increase in costs. **We cannot provide this level of detail.**

We note that a 'rule of thumb' for many years has been \$150-250K per Mile of line upgrade. With the ~2.5 miles of upgrades, this cost should be around \$375K to \$625K. A cost of ~\$1.39m is a very substantial departure from this standard.

**Request 2:**

Please confirm that the scope provided in the SIS dated December 20th, 2018 has not changed. **Confirmed.**  
**The scope has not changed.**

**Request 3:**

Please clarify the reasons for the increase in cost. **After several true-ups that we have conducted on similar projects, we have found the initial costs that were provided historically (both ballpark costs, and detailed estimates) to be significantly underestimated. Therefore we have applied a new formula to ensure that the upfront costs more closely align with the final true up numbers.**

**Request 4:**

We request that a Construction Planning Meeting be scheduled to review the results. We ask that you provide these requested details in writing prior to scheduling a Construction Planning Meeting for Williams Solar, LLC so that we can have a detailed discussion about costs. **We will work on scheduling a construction planning meeting within the time allotted.**

**Request 5:**

Please provide guidance on the earliest possible in-service date for the Duke Interconnection Facilities. **We cannot provide estimated in service dates until the IA is executed, upfront costs are paid, and the project is released to construction.**

I ask that you please confirm receipt of this email. Further, I ask that you provide the requested information within 5 Business Days or alternatively suspend the deadline provided in your email.

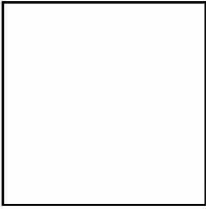
Thank you for your help in clarifying this FS Result.

Regards,

Fred Flagstad

Vice President, GreenGo Energy

Authorized Signatory for Williams Solar, LLC



Frederik Thoring Flagstad | Vice President

GreenGo Energy US, Inc. | 1447 S. Tryon St., Suite 201, Charlotte, NC 28203

Email: [interconnection@greengoenergy.com](mailto:interconnection@greengoenergy.com) | Mobile: +1 (704) 612 3010

Confidentiality Notice: The information contained in this message may be privileged and confidential and protected from disclosure. If the reader of this message is not the intended recipient, or an employee or agent responsible for delivering this message to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by replying to the message and deleting it from your computer. Thank you.

On Tue, Jul 30, 2019 at 1:05 PM Winter, Lee P <[Lee.Winter@duke-energy.com](mailto:Lee.Winter@duke-energy.com)> wrote:

**Dear Williams Solar,**

The Interconnection Facilities and System Upgrades (the Facility Study) design and cost estimation for Williams Solar, LLC is complete. Per North Carolina Interconnection Procedures (NCIP) Section 5.1, at this time, you have the option to request a Construction Planning Meeting within 10 business days of receiving this Facility Study Report. If you wish to proceed with this meeting, please submit your request in writing.

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- If a Non-contributory Plan is elected, you must establish financial security arrangements for the initial term of this agreement. Additionally, you agree to maintain an irrevocable letter of credit in the amount of **\$151,095.13** for the full term of the initial contract period. You will pay overhead and commissioning costs upfront of **\$45,400.00**. You will also pay to Utility a Monthly Facilities Charge of **\$1,412.10** (1.0 % of the estimated installed cost of **\$141,210.40** = estimated construction cost + estimated metering cost).

All estimated costs are subject to being trued-up to actuals after construction, and the IA amended.

Next Steps:

1. Within 10 business days, please provide your requested in-service date for Duke facilities to be in place and operational. If this request date cannot be accommodated, we will advise you of the earliest possible date.
2. At the same time you send the requested in-service date, please provide a response indicating whether or not you would like to request a Construction Planning Meeting.
  - a. If you do not request a Construction Planning Meeting, we will tender an executable IA within 15 business days after receipt of your requested in-service date.
  - b. If you do request a Construction Planning Meeting, we will schedule the meeting as soon as a mutually agreeable date is determined. We will not be able to tender an IA until after the occurrence of the Construction Planning Meeting, at such time it would be delivered within 15 business days after the Construction Planning Meeting.

*Lee Winter*

Wholesale Renewable Manager

Distributed Energy Technology



919-546-2207

919-219-7445 (mobile)





September 9, 2019

**Via Email**

[DERContracts@duke-energy.com](mailto:DERContracts@duke-energy.com)

[Bo.Somers@duke-energy.com](mailto:Bo.Somers@duke-energy.com)

[Jack.Jirak@duke-energy.com](mailto:Jack.Jirak@duke-energy.com)

**Re: Notice of Dispute—Williams Solar, LLC (Queue No. NC2016-02927)**

Dear Jack:

I am writing to provide Notice of Dispute to Duke Energy Progress, LLC (“*DEP*”) under Section 6.2 of the North Carolina Interconnection Procedures for State-Jurisdictional Generator Interconnections, Docket E-100, Sub 101 (the “*Interconnection Procedures*”), on behalf of GreenGo Energy US, Inc. (“*GreenGo*”), in its own right and on behalf of its managed solar project, Williams Solar, LLC (“*Williams Solar*”), Queue No. NC2016-02927.

By its System Impact Study Report dated December 20, 2018, DEP gave notice to Williams Solar of, among other things, certain System Upgrades required to be performed in order to effectuate the requested interconnection. The Upgrades included replacing non-electronic protective devices such as fuses or hydraulic reclosers with electronic devices and reclosers. In its SIS Report, DEP stated that “[t]he budgetary One-Time estimate for the required System Upgrades is **\$774,000.**”

By email dated July 30, 2019, DEP provided notice to Williams Solar that the Interconnection Facilities and System Upgrades (“*Facility Study*”) design and cost estimation for the project was complete. By this notice, DEP informed Williams Solar that the estimated cost of the System Upgrades was **\$1,388,374.26** (including sales tax), nearly double the estimate provided in the SIS Report, despite that the required Upgrades remained substantially identical to those identified in the SIS Report.

Williams Solar hereby provides Notice of Dispute as to the new, revised System Upgrades cost estimate. While Williams Solar recognizes that the original figure provided by DEP in connection with its SIS Report was only an “estimate,” Williams Solar reasonably relied on this estimate in moving forward with this project; DEP has provided no justification for the extraordinary deviation from the original estimate—which Williams Solar assumes was issued in good faith by DEP based on best available information—in the new, revised estimate provided only seven months later; and, as such, the new estimate appears to be an unreasonable and unsupported obstacle to interconnection created by DEP that does not reflect reasonable estimated costs.

GreenGo reserves the right to articulate additional grounds of dispute in informal dispute resolution proceedings conducted pursuant to the Interconnection Standards and/or in a formal complaint proceeding. GreenGo also reserves the right to revise this Notice of Dispute to the extent that other GreenGo development partners receive similar new, substantially revised cost estimates.

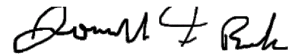
Notice of Dispute  
September 9, 2019  
Page 2

GreenGo notes that under the North Carolina Interconnection Standards, the initiation of this dispute shall preserve the interconnection queue position of the covered project(s) pending resolution of the dispute.

We welcome the opportunity to discuss this dispute with you at the earliest opportunity.

Thank you for your assistance.

Sincerely yours,



Jon Burke  
President, Development  
GreenGo Energy US, Inc.  
*Agent for Williams Solar, LLC*



Jack E. Jirak  
Associate General CounselMailing Address:  
NCRH 20 / P.O. Box 1551  
Raleigh, NC 27602o: 919.546.3257  
f: 919.546.2694

jack.jirak@duke-energy.com

October 2, 2019

**VIA ELECTRONIC MAIL**

Mr. Jon Burke  
President, Development  
GreenGo Energy US, Inc.  
Agent for Vintage Solar 2, LLC  
1447 S. Tryon Street  
Charlotte, NC 28203

Dear Mr. Burke:

Duke Energy Progress, LLC (“DEP” or the “Company”) has reviewed the Notice of Dispute dated September 9, 2019 (“NOD”) submitted by GreenGo Energy US, Inc. (“GreenGo”) on behalf of Williams Solar, LLC (“Williams Solar”) and hereby provides this response. Capitalized terms not otherwise defined herein shall have the meaning assigned to them in the North Carolina Interconnection Procedures (“NC Procedures”).

Section 4.3.5 of the NC Procedures states that the “[t]he System Impact Study Report will provide the Preliminary Estimated Upgrade Charge, which is a *preliminary indication of the cost*... that would be necessary to correct any System problems identified.” (emphasis added) The NC Procedures define Preliminary Estimated Upgrade Charge as “[t]he estimated charge for Upgrades that is developed using *high level estimates* including overheads and is presented in the System Impact Study Report. *This charge is not based on field visits and/or detailed engineering cost calculations.*” (emphasis added).

By definition, “high level estimates” are not based on detailed engineering and therefore are not firm in nature and subject to further adjustment. Williams Solar’s decision to “move forward with this project” based on a cost estimate that was expressly subject to further adjustment does not impact or alter the Company’s obligation to produce the most accurate revised estimated cost possible through the Facilities Study process. While Williams Solar asserts that “DEP has provided no justification for the extraordinary deviation from the original estimate...in the new,

revised estimate provided only seven months later,” there is, in fact, no obligation under the NC Procedures for the Company to provide justification for changes in cost estimates between the estimate produced during the System Impact Study and the estimate produced during Facilities Study. By virtue of the fact that the Company is obligated under the NC Procedures to produce a more refined estimate during the Facilities Study, the NC Procedures assume that the estimate provided at System Impact Study will change in the Facilities Study.

The revised cost estimate is a product of the more detailed engineering that the Companies performed as part of the Facilities Study. In addition, the revised estimate has been informed by DEP’s extensive recent experience in connection with its nation-leading interconnection successes. Specifically, as the Company has gained experience in completing the interconnection of thousands of megawatts of solar generating facilities, it has gathered a substantial amount of information concerning the actual cost of Upgrades. Consistent with Good Utility Practice, the Company has endeavored to use this information to continually refine its estimates. In the case of Williams Solar, the Company utilized such actual cost data to refine the Upgrade cost estimates to ensure that such estimates better reflect actual costs being incurred in the field. There are a number of factors that have contributed to escalating actual costs, including increase labor and equipment costs.

The Company also strenuously objects to the NOD’s assertion that the Upgrade cost estimate, which has been revised in accordance with the NC Procedures, is an “obstacle to interconnection created by DEP that does not reflect reasonable estimated costs.” While the Company has utilized its actual experience to develop the revised cost estimate, Williams Solar has provided no evidence to support its allegation that the cost estimate is not “reasonable.” Furthermore, the revised cost estimate is not an “obstacle” but instead provides Williams Solar with the most accurate estimate possible in accordance with the NC Procedures in order to allow Williams Solar to make a fully informed decision regarding whether to move forward to an Interconnection Agreement.

In accordance with Section 6.1.2 of the Interconnection Agreement, Williams Solar will, upon completion of the Interconnection Facilities and Upgrades, only pay the actual cost incurred by DEP and receive a refund if the cost estimate included in the Interconnection Agreement exceeds the actual costs. Execution of an Interconnection Agreement with the more accurate estimate of the Upgrade costs developed during the Facilities Study does not, in any way, alter the fact that Williams Solar is obligated under the NC Procedures to pay the actual costs of the Interconnection Facilities and Upgrades.

In summary, the Company rejects the allegations in the NOD and stands behind its cost estimate in the Facilities Study Report delivered to Williams Solar.

Sincerely,

*/s/Jack Jirak*

Jack Jirak

cc: Tim Dodge, North Carolina Utilities Commission Public Staff



BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 1220

In the Matter of	)	
Williams Solar, LLC,	)	
	)	
Complainant	)	
	)	<b>RESPONDENT DUKE ENERGY</b>
	)	<b>PROGRESS, LLC'S RESPONSES</b>
	)	<b>TO COMPLAINANT'S FIRST SET</b>
v.	)	<b>OF INTERROGATORIES AND</b>
	)	<b>REQUESTS FOR PRODUCTION</b>
Duke Energy Progress, LLC,	)	<b>OF DOCUMENTS</b>
	)	
Respondent	)	

---



Pursuant to Rules 26, 33, and 34 of the North Carolina Rules of Civil Procedure and the Rules of Practice and Procedure of the North Carolina Utilities Commission (“Commission”), Duke Energy Progress, LLC’s (“DEP”, or “the Company” or “Duke”) hereby submits this response to Complainant Williams Solar, LLC’s (“Williams Solar” or “Complainant”) First Set of Requests for Production of Documents and Interrogatories (“Requests”).

### **OBJECTIONS TO INSTRUCTIONS**

1. Duke objects to Williams Solar’s instruction No. 4 to the extent it directs Duke to identify “the name of the witness in this proceeding who will sponsor the answer and can vouch for its accuracy.” At this time, Duke has not identified the Company personnel who will testify in this proceeding. Moreover, the Company’s trial preparation materials, including but not limited to the case strategy of Duke’s attorneys and the draft pre-filed testimony of Duke’s prospective witnesses are protected as attorney work product and not subject to discovery. Nevertheless, Duke’s answers to Complainants’ Requests identify the employee sponsor(s) for each Response, which reflects the personnel who participated in preparing that Response.

### **GENERAL OBJECTIONS**

Each of the specific responses below is made subject to and without waiving these General Objections:

1. The information contained herein is provided in accordance with the provisions and intent of the North Carolina Rules of Civil Procedure and the North Carolina Utilities Commission’s Rules and Regulations, which call for the disclosure of non-privileged information and materials within the responding party’s possession, custody, or control that may be relevant or lead to the discovery of admissible evidence. These responses are made without waiving any rights or objections, or admitting the authenticity, relevancy, materiality, or

admissibility into evidence of the subject matter or facts in any Request or any response thereto. Furthermore, Duke specifically reserves the right to object to the uses of any response, or the subject matter thereof, on any grounds in any further proceeding in this action.

2. Duke objects to the Requests (including the instructions and definitions accompanying the Requests) to the extent that they impose requirements beyond those set forth in the North Carolina Rules of Civil Procedure and/or the North Carolina Utilities Commission's Rules and Regulations.

3. Duke objects to the Requests to the extent that they seek information unrelated to issues raised in this action. Any production of information not related to the issues raised by this action shall not waive this objection and shall not be deemed to consent to the admissibility of such information.

4. Duke objects to the Requests to the extent they call for production of mental impressions of counsel or information that was prepared in anticipation of litigation and/or that is otherwise protected by the attorney-client privilege, the work product doctrine, or other applicable privileges.

5. Duke objects to each Request to the extent it is overbroad, unduly burdensome, not reasonably calculated to lead to the discovery of admissible evidence, or is not proportional to the scope of this case. In particular, Duke objects to each Request to the extent it calls for the production of "all documents and data" related to identified topics, as a complete, unfiltered search of the Company's voluminous electronic data would be unduly burdensome and not proportional to the scope of this case. Where such requests for "all documents and data" are made, Duke undertook reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to each Request, and such personnel

identified as a “Sponsor” of each Response have produced responsive information and documents.

6. Duke objects to each Request to the extent it seeks information or Documents that precedes the time period during which Williams Solar has been an Interconnection Customer of DEP (October 2016 to present), as such Requests are unduly burdensome, not relevant to the Company’s processing of Williams Solar’s Interconnection Request or reasonably calculated to lead to the discovery of admissible evidence, and are not proportional to the scope of this case.

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

1. Provide the entire basis for DEP's initial estimate of \$774,000, including, without limitation, an itemization of all costs included in that estimate and any overhead amounts assumed in that estimate. As part of your response, identify all documents evidencing or relating to the estimate.

**Response:**

Each generator interconnection project's preliminary estimated upgrade cost projections developed by DEP in the System Impact Study are calculated based on a standardized template cost estimation tool, SIS Estimate Tool Rev1, as further discussed in the Company's response to Williams Solar's Request Nos. 1-7 and 1-8. The SIS Estimate Rev1 is the most updated version of the SIS Estimate Tool Rev0. Further explanation of the process DEP uses to estimate costs is provided in DEP's response to Data Request No. 1-3.

The System Modifications project file used to generate preliminary estimated upgrade costs for Williams Solar is being produced in response to Request for Production No. 1-2, and is labeled "Williams Solar Estimation Tool SIS.xls." Labor, materials, and overhead are included in the \$774,000 estimate based on work management data available as of the issuance date of the System Impact Study report for Williams Solar.

**Sponsor:** Neil Bhagat, Manager, Asset Management/Distributed Generation, Duke Energy

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

2. Provide the entire basis DEP's estimated installed cost of \$1,388,374.26, including, without limitation, an itemization of all costs included in that estimate and any overhead amounts assumed in that estimate. As part of your response, identify all documents evidencing or relating to the estimate.

**Response:**

The \$1,388,374.26 refers to the Estimated System Upgrades plus Sales Tax of 7%

Estimated System Upgrade:	\$1,297,546.03
NC Sales Tax – 7%:	\$ 90,828.22
<b>Total:</b>	<b>\$1,388,374.25</b>

The System Upgrades are comprised of:

- Labor Costs
- Labor Overheads
- Vehicle and Equipment Costs
- Vehicle and Equipment Costs Overheads
- Material Costs
- Material Overheads
- Contingency – 20%

<b>Estimated Labor Costs Total (LC)</b>	<b>\$</b>	<b>725,040.00</b>
<b>Estimated Vehicle / Equipment Total (VC)</b>	<b>\$</b>	<b>290,016.00</b>
<b>Estimated Total Material Costs (EMC)</b>	<b>\$</b>	<b>282,490.03</b>
<b>Estimate</b>	<b>\$</b>	<b>1,297,546.03</b>

**Total Labor Costs (LC) for Project**

LC	\$3,180 X 1 crew x 4 people per crew times 38 weeks	= \$483,360
Contingency	\$483,360 X 0.20	= \$ 96,672
Overheads	\$580,032 X 0.25	= \$145,008
<b>Total Labor Costs (LC)</b>		<b>= \$725,040</b>

## Vehicle Costs (VC)

Cost per Man Week = $(\$30 \times 5 \times 8) \times 1.06$	= \$ 1,272
VC \$ 1,272 X 1 crew x 4 people per 38 weeks	= \$193,344
Contingency \$193,344 X 0.20	= \$ 36,689
Overheads \$232,013 X 0.25	= \$ 58,003
<b>Total VC (with Inflation and Overheads)</b>	<b>= \$290,016</b>

## Estimated Material Costs (EMC)

\$143,328 X 1.06 inflation assumption for 2 years	= \$151,927
Material Overheads \$151,927 X 0.4875	= \$ 74,065
Sub Total \$151,927 + \$74,065	= \$225,992
Contingency \$225,992 X 0.20	= \$ 45,198
Overheads \$45,198 X 0.25	= \$ 11,300
<b>Total EMC (with Inflation and Overheads)</b>	<b>= \$282,490</b>

**Sponsor:** Beckton James, Senior Business and Technical Consultant, Duke Energy

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

3. With respect to the cost data relied upon by DEP in generating cost estimates for interconnection customers, state (a) how the cost data were estimated, (b) who performed the estimation, and (c) whether they reflect competitive bidding prices for parts, equipment, and labor.

**Response:**

Generator Interconnection cost estimates are generated in two phases corresponding to the System Impact Study and Facilities Study processes:

First, the System Impact Study estimated cost are based on reviewing the upgrades identified in the System Impact Study Report with the existing conditions and any current proposed non-DER upgrades in the DEP Graphical Information System (GIS) and a per mile cost estimation sheet. The SIS Estimation Tool Rev0 (which is being produced in DEP's response to Request for Production of Documents No. 5), has typical system upgrade project cost estimates on a per mile basis. These estimated cost data inputs to the cost estimate sheet were developed by the Capacity Planning Department based on overhead distribution line construction completed in DEP on a per mile cost basis. This cost estimation sheet is utilized to estimate costs for both internal overhead distribution line construction projects, as well as System Impact Study estimates for generator interconnections. The Capacity Planning Department also more recently developed the SIS Estimation Tool Rev0 based on completed projects. The cost data relied upon by DEP in generating cost estimates in the cost estimate tool is based upon the following categories of procured costs:

- a. Overhead Contractors (Labor/Equipment) – The contractors completing those projects were selected on a competitive basis and were required to satisfy DEP's qualifications including safety, construction quality, presence in our region, ability to scale, cost and other factors.
- b. Material/Parts – Duke obtains competitive pricing for material purchases and performs a technical and commercial evaluation to determine the best overall evaluated pricing to select an approved supplier or in many cases multiple suppliers. Duke periodically reviews market conditions to assess indices relative to raw material cost and perform cost modeling for approved price adjustments.
- c. Engineering Labor - Pike Engineering is an engineering contractor for both Duke Energy Progress and Duke Energy Carolinas. Their rates for engineering labor were competitively bid.

Second, the detailed cost estimate provided in the Facilities Study is developed by Duke's Major Projects design organization, either by a Duke Energy Engineering Technologist, or by an offsite contract engineering partner such as Pike Engineering, with final review by a Duke Energy Engineering Technologist. This design process is completed in Maximo, which is used in conjunction with a MicroStation based graphical design tool, Bentley Open Utilities Designer (BOUD), for the development of schedulable tasks, bills of material, and cost estimates. This process is used for all types of Distribution construction work, including Customer Additions, Capital Maintenance, System Improvements, as well as generator interconnections. Compatible units are used as the basis for the design process, specifically for purposes of developing an estimate of the materials and labor hours required to perform the scope of work for a given design.

DEP began using the Maximo and BOUD tools for work order design and estimation in November 2017. Prior to this date, DEP used a similar system called Work Management Information System (WMIS), developed by CGI, for the same purposes. WMIS also utilized a compatible unit process in order to develop estimates of material and labor hours.

In both systems, the process of using compatible units to develop the design and cost estimate involves selection of compatible units, which represent the scope of work being performed. The compatible unit library used in both systems contained a combination of material only compatible units, labor only compatible units, and combination material/labor compatible units. The selection process for compatible units is based on the currently published Distribution Standards manual, which specifies the materials and equipment used for approved styles of installations.

Most compatible units on a design are associated with primary material items used, such as poles, conductor, switches, etc. Each of these compatible units captures what material item numbers and how many labor hours are required to perform the work associated with the compatible unit. Material only compatible units are less common, and associated with minor items such as hardware and connectors in which the labor hours are associated with a higher-level compatible unit. Finally, labor only compatible units are added to a design to capture anticipated labor time that is not reflected in a material only compatible units. Examples of labor-only compatible units are hand digging for poles or anchors, transferring conductor, and laying wire out for reconductors.

In addition to the material and labor compatible units noted above, designers have an opportunity to include "cost adder" compatible units to account for unique costs not associated with standard construction. Examples of when cost adder compatible units might be used are environmental permitting, controls and/or remediation, or other civil work such as asphalt/concrete removal or remediation.

Once a designer has tabulated the list of compatible units associated with a design for the given scope of work, they perform a step called "estimation" which calculates the total material and labor costs for the design. The design cost estimate is based on the following components: direct material costs, material overheads, direct labor costs, and labor overheads. Labor costs are



described in more detail in the Company's responses to Request Nos. 1-4 and 1-10. Material costs are estimated based on near real-time system average costs. Duke obtains competitive pricing for material purchases and performs both a technical and commercial evaluation to determine the best overall evaluated pricing to select an approved supplier or in many cases multiple suppliers before executing contracts. Periodically, a review of market conditions is performed to assess indices relative to raw material cost and perform cost modeling for approved price adjustments.

Following development of the Maximo cost estimate, generator interconnection projects are then run through a secondary cost estimation tool, the Revised Estimating Tool ("RET"), which was developed to help provide more accurate cost to customers based on actual construction costs. A detailed explanation of this revised cost estimating tool, labeled "DR No. 1-3 Revised Estimating Tool Description – Williams Solar.doc," is being produced in Request for Production of Documents No. 1.

The RET updates the existing cost produced in Maximo to more accurately reflect total project costs Duke will likely incur from completion of Facilities Study through completion of interconnection-related project construction. The primary adjustments made by the RET are accounting for increased future costs by projecting inflation-impacted labor, material and equipment costs, modeling more likely resourcing and equipment requirements and adding a contingency factor for unforeseen events that have historically increased costs for generator interconnection projects.

**Sponsors:** Brian Dale, Engineer III, Asset Management Distributed Generation; Genevieve Bestercy, Sourcing Specialist, Transmission and Generation Grid Solutions Labor and EPC; Beckton James, Senior Business and Technical Consultant, Duke Energy; Scott Jennings, Director, Customer Delivery Area Operations; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

4. Describe how contracts for construction of interconnection facilities and system upgrades are awarded, including, without limitation, whether such contracts are the result of competitive bidding or are sole-source contracts.

**Response:**

In 2017, DEP undertook a targeted competitive request for proposal and negotiation process to obtain construction contractor services for overhead/underground distribution line construction services, including construction of interconnection facilities and system upgrades, in the Carolinas region. Many rounds of negotiations and evaluations resulted in the award of four contracts for construction contractor services for designated geographic regions of DEP's system. The negotiated contracts are for a term of five years, extending through 2022. The Company is producing the single source justification forms documenting the award of these contracts in response to this request. These files are labeled as follows and being produced in response to Request for Production No. 1-10:

- "CONFIDENTIAL DR No. 1-4 2017 SSJ Form Mastec.pdf"
- "CONFIDENTIAL DR No. 1-4 2017 SSJ Form Pike.pdf"
- "CONFIDENTIAL DR No. 1-4 2017 SSJ Form Sumter.pdf"
- "CONFIDENTIAL DR No. 1-4 2017 SSJ Form ULCS.pdf"

DEP will produce the foregoing documents information subject to a mutually-agreeable confidentiality agreement between DEP and Williams Solar. DEP has redacted all Interconnection Customer-identifiable information as confidential and/or proprietary and not subject to disclosure under the North Carolina Interconnection Procedures.

**Sponsor:** Genevieve Bestercy, Sourcing Specialist, Transmission and Generation Grid Solutions Labor and EPC

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

5. Describe in detail the process used to create the Preliminary Estimated Upgrade Charge provided to Williams Solar. As part of your response, identify (a) all individuals who participated or otherwise assisted in creating the Preliminary Estimated Upgrade Charge provided to Williams Solar, LLC and the role of and actions taken by such person; and (b) all documents or data reflecting or evidencing the estimate.

**Response:**

A study engineer is responsible for creating the Preliminary Estimated Upgrade Charge for the System Impact Study Report. The study engineer reviewed the project under the DEP's System Impact Study evaluation process, which is described in a file labeled "System Impact Study SOP.pdf" being produced in DEP's response to Request for Production of Documents No. 5. Based upon this review, the study engineer then identified necessary upgrades required to safely and reliably interconnect the Williams Solar facility. The identified upgrades were then itemized and entered into the System Impact Study cost estimation spreadsheet by the study engineer, as further described in DEP's response to Data Request No. 1-3. Within the cost estimation spreadsheet, each upgrade was assigned a cost. The total upgrades cost was then calculated.

For Williams Solar, the study engineer responsible for developing the Preliminary Estimated Upgrade Charge included in the System Impact Study Report was a Pike Engineering Employee. Duke Energy Engineers review portions of the System Impact Study and provide approval for their department. Capacity Planner Alex Winslow reviewed the voltage and RVC study. Distribution Protection and Control engineer Andrew Kurczek (Pike Engineering) reviewed the protection study. The system upgrades necessary to safely and reliably interconnection the facility are identified through the voltage, RVC, and Protection studies. The two engineers mentioned above reviewed the accuracy of the study and confirmed the preliminarily-identified upgrades are needed, but do not estimate the cost for the identified system upgrades. The standardized cost estimation tool used to generate preliminary estimated upgrade costs for Williams Solar is further described in response to Request Nos. 1-1 and 1-3, and is being produced in response to Request for Production of Documents No. 5.

**Sponsor:** Neil Bhagat, Manager, Asset Management/Distributed Generation/ Dmitri Moundous, Senior Engineer, Asset Management/Distributed Generation

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

6. Identify by line item type the “historic cost data for similar projects,” if any, used by DEP in developing the Preliminary Estimated Upgrade Charge. As part of your response, identify the project(s) for which such data was acquired and the period during which the upgrades for such project(s) were constructed.

**Response:**

The creation of the “SIS Estimation Tool Rev0” tool originated in work order designs created in the late 1990’s or early 2000’s for general distribution work. Sometime between 2000 and 2005, the work orders were converted to the Work Management Information System (WMIS) and the format of the “SIS Estimation Tool Rev0” tool was developed. Work orders were created in WMIS on various types of construction needed to complete System Improvement projects. The work orders were based upon generic work orders historically and were initially refreshed annually through a labor intensive manual process. Each year, if a new type of System Upgrade was needed, a new work order would be created to cover the need. These work orders correspond to “historic cost data for similar projects” referenced in DEP’s Answer.

In recent years, an adjustment factor was added to the SIS Estimation Tool Rev0 to increase labor costs based experienced changes in labor expense. As more time passed between the latest revision of the estimates used to feed the tool and the application of the tool, a decision was made to increase the base labor factor to keep up with rising labor charges.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation; Neil Bhagat, Manager, Asset Management/Distributed Generation; Jack McNeil, Director, Asset Management Dmitri Moundous, Senior Engineer, Asset Management/Distributed Generation

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

7. Describe in detail DEP's efforts, if any, during the period from January 1, 2015, to the present, to update the cost data per line item type used to generate Preliminary Estimated Upgrade Charges. As part of your response, identify all documents evidencing or relating to such efforts.

**Response:**

DEP objects to the temporal scope of this request "from January 1, 2015, to the present" as overbroad, unduly burdensome and because DEP's "efforts...to update the cost data per line item type" prior to the date that Williams Solar submitted an Interconnection Request is not relevant to the issues raised in the Complaint, as such "efforts" do not impact the Preliminary Estimate Upgrade Charge for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

The cost data per line item values were not updated during the period January 1, 2015 through June 2019 for the SIS Estimation Tool Rev0. The updated System Impact Study cost estimation tool, "SIS Estimation Tool Rev1, was created in June 2019 as discussed in the Company's response to Data Request No. 1-8. Also in June 2019, however, after a number of generator interconnection Final Accounting Report ("FAR") true ups were completed, DEP determined that the SIS Estimation Tool Rev 1 needed to have an additional contingency factor of 2.0 added to more accurately reflect the estimate of interconnection facilities and system upgrade costs.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation; Neil Bhagat, Manager, Asset Management/Distributed Generation; Jack McNeil, Director, Asset Management

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

8. Describe, and provide the reason for, any change during the period January 1, 2015, to the present, to the procedure by which DEP generates estimates of the cost of system upgrades or interconnection facilities to be provided with system impact studies, including changes to any tool used to generate such estimates and changes to any assumptions made in generating those estimates. As part of your response, identify all documents evidencing any change identified in response to this interrogatory.

**Response:**

DEP objects to the temporal scope of this request “during the period January 1, 2015, to the present” as overbroad, unduly burdensome, and because any “change...to the procedure by which DEP generates estimates of the cost of system upgrades or interconnection facilities” made prior to the date that Williams Solar submitted an Interconnection Request to DEP is not relevant to the procedures employed by DEP to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

As explained in the Company’s response to Request Nos. 1-3 and 1-7, DEP first updated the Facility Study cost estimation process and afterwards updated the System Impact Study cost estimation process in June of 2019, creating the SIS Estimation Tool Rev1. DEP did not modify the procedure or tools used for estimating System Impact Study costs during the period 2015 throughout June 2019. Over the last few years, DEP has adjusted labor, equipment and material values to account for increasing costs. However, there has been no changes in the procedure by which DEP generated estimates of the cost of system upgrades or interconnection facilities to be provided with system impact studies. The provided documents labeled “SIS Estimation Tool Rev0” and “SIS Estimation Tool Rev1” reflect the adjustment in costs and are provided in response to Document Request No. 5. SIS Estimation Tool Rev0 was the original tool used by DEP engineers to estimate internal work. The SIS Estimation Tool Rev1 was created from Rev0 in June 2019 for interconnection projects.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation; Neil Bhagat, Manager, Asset Management/Distributed Generation; Jack McNeil, Director, Asset Management  
Dmitri Moundous, Senior Engineer, Asset Management/Distributed Generation

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

9. For the period 2015 to the present, describe any difference between DEP's process for estimating costs of constructing upgrades necessary for interconnection of independent generation (i.e., PURPA qualified facilities) and DEP's process for estimating DEP's own construction costs (i.e., for system modifications including for interconnection of DEP's own generation facilities or other system modifications undertaken by DEP), including, without limitation, (a) identifying any difference in the estimation of the cost of parts, labor, and overheads; and (b) identifying any difference in the actual cost of parts, labor, overheads, and labor rates for such projects.

**Response:**

DEP objects to the temporal scope of this request "for the period January 1, 2015 to the present" as overbroad, unduly burdensome and because "any difference between DEP's process for estimating costs of constructing upgrades necessary for interconnection of independent generation (i.e., PURPA qualified facilities) and DEP's process for estimating DEP's own construction costs (i.e., for system modifications including for interconnection of DEP's own generation facilities or other system modifications undertaken by DEP)," having occurred prior to the date that Williams Solar submitted its Interconnection Request to DEP is not relevant and outside the scope of this proceeding, as such differences have no effect on the procedures employed by DEP to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

DEP utilizes the same design and cost estimating process (use of Maximo and common design standards) for all Distribution construction projects that is used for estimating costs of construction upgrades necessary for interconnection of independent generation (i.e. PURPA qualifying facilities) and DEP's own construction costs (i.e., for system modifications including for interconnection of DEP's own generation facilities or for customer addition, reliability improvement or other system modifications undertaken by DEP). Specifically, DEP utilizes Maximo for both independent generation and DEP-owned projects, as further described in the Company's response to Data Request No. 1-3. However, as described in DEP's response to Request No. 1-3, DEP has also integrated a generator interconnection-specific Revised



Estimating Tool as part of the Facilities Study process. A similar mechanism is utilized for NCDOT requested relocations, in which a Maximo design estimate is run through a secondary estimating tool that was developed based on actual costs experienced for NCDOT requested projects.

**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

10. Describe DEP's efforts, if any, during the period from January 1, 2015, to the present, to update the cost data used to generate internal estimates of the costs of DEP's own upgrades of or modifications to the distribution system or transmission system. As part of your response, identify all documents evidencing or relating to such efforts.

**Response:**

DEP objects to the temporal scope of this request "during the period from January 1, 2015, to the present" as overbroad, unduly burdensome and because DEP's "efforts [to] update the cost data" prior to the date that Williams Solar submitted its Interconnection Request to DEP is not relevant and outside the scope of this proceeding, as such efforts did not impact the procedures DEP employed to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

As noted in the Company's response to Data Request No. 1-3, Duke's cost estimates to perform overhead distribution system construction work, including generator interconnection-related work, are based on the following: direct material costs, material overheads, direct labor costs, and labor overheads. Note there is no difference in the cost data used for DEP's internal estimates of its own upgrades as compared to the cost data used for generator interconnection upgrades.

Since the implementation of Maximo in November 2017, material costs are tracked internally and shared within the different applications of Maximo on a near real-time basis. Material costs for design estimates are based on system average cost for each item number, based on purchase and transaction history for each item, at the time when the estimate is performed. In addition to these direct material costs, the system then adds an overhead percentage, which is calculated on an annual basis by Duke's Finance department to represent the stores and handling costs associated with internal Supply Chain processes.

Labor cost is calculated based on a summation of all the labor hours associated with the compatible units included on the design, the type(s) of construction resource (overhead, underground, etc.) required to perform the work, and the system average hourly labor rate

associated with the type(s) of construction resources required. As with material costs, there is also a labor overhead percentage that is applied to the labor cost and represents the engineering, administrative and management costs associated with support of the direct construction work. Both the hourly labor rates and the labor overhead percentages are calculated on an annual basis by Duke's Finance department.

When reviewing the recent history (3-5 years) of cost estimates produced by the systems as described above, material costs have been reasonably accurate (when comparing estimated to actual costs) and consistent in terms of year over year changes. However, when comparing Duke's historical experience for labor costs, actual labor costs have exceeded estimated labor costs. In response, Duke took the following steps in Fall 2019 to develop more accuracy in labor cost estimating within Maximo:

- Detailed analysis of the labor hours included in commonly used compatible units
- Detailed analysis of how weighted hourly labor cost is calculated.

Based on the analysis of labor hours associated with compatible units in DEP, it was determined that the number of manhours associated with common tasks such as installing poles, transformers and line hardware were too low. This determination was based on comparison of these tasks against both Construction SME input and unit-based contract rates. Increases are attributed to new safety work practices that have been implemented over the past several years. As a result, labor manhours were increased on the compatible units such that it represented an approximately 20% increase to the time necessary to perform typical overhead distribution construction work.

In addition to the labor hours associated with tasks, the calculation of hourly labor rates used for cost estimating in Maximo was also reviewed. Historically, cost estimates had been produced based on an internal (Duke Energy employee) labor assumption. Over time, labor costs for contracted labor have increased to the point that they are higher than Duke internal rates, but this input had not previously been considered within Maximo. A new formula was developed to create a weighted average manhour rate for use in Maximo that reflected the balance of internal and external labor used in each jurisdiction. This update resulted in a ~15% increase to the hourly manhour rate used and is reflected in the graph in response to Request No. 21.

The data updates described above became effective for cost estimates developed in Maximo starting in Q4 2019. These would not have had an impact on the development of cost estimates associated with cost estimates provided to Williams Solar.

**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

11. Describe in detail the process used to create the estimate of system upgrade charges provided to Williams Solar in connection with the Facility Study Report. As part of your response, identify (a) all individuals who participated or otherwise assisted in creating the estimate of system upgrade charges provided to Williams Solar in connection with the Facility Study Report and the role of and actions taken by such person; and (b) all documents or data reflecting or evidencing the estimate.

**Response:**

Please see DEP's responses to Data Request Nos. 1-3 and 1-9.

**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

12. Describe DEP's efforts, if any, during the period from January 1, 2015, to the present, to update the cost data used to generate estimates of the cost of system upgrades or interconnection facilities to be provided with facilities study reports. As part of your response, identify all documents evidencing or relating to such efforts.

**Response:**

DEP objects to the temporal scope of this request "during the period from January 1, 2015, to the present" as overbroad, unduly burdensome and because DEP's "efforts . . . update the cost data used to generate estimates of the cost of system upgrades or interconnection facilities to be provided with facilities study reports" prior to the date that Williams Solar submitted its Interconnection Request to DEP is not relevant and outside the scope of this proceeding, as such efforts did not impact the procedures DEP employed to generate the cost of system upgrades or interconnection facilities provided for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

Please see DEP's responses to Request Nos. 1-3 and 1-10.

**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

13. Describe any change during the period January 1, 2015, to the present, to the procedure by which DEP generates estimates of the cost of system upgrades or interconnection facilities to be provided with facilities study reports, including, without limitation, changes to any tool used to generate such estimates and changes to any assumptions made in generating those estimates. As part of your response, identify all documents evidencing any change identified in response to this interrogatory.

**Response:**

DEP objects to the temporal scope of this request “during the period from January 1, 2015, to the present” as overbroad, unduly burdensome and because DEP’s “changes . . . to the procedure by which DEP generates estimates of the cost of system upgrades or interconnection facilities to be provided with facilities study reports” prior to the date that Williams Solar submitted its Interconnection Request to DEP is not relevant and outside the scope of this proceeding, as such efforts did not impact the procedures DEP employed to generate the cost of system upgrades or interconnection facilities provided for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

Please see DEP’s responses to Data Request Nos. 1-3 and 1-10.

**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

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Item No. 1-14  
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**DUKE ENERGY PROGRESS, LLC**

**Request:**

14. Describe in detail the investigation referred to at pages 4 and 5 of DEP's Answer and Motion to Dismiss and its conclusions, including, without limitation, identifying the date DEP determined an investigation was needed, the date the investigation began, the date the investigation concluded, all individuals who participated in the investigation and the role of and actions taken by each such person. As part of your response, identify all documents evidencing changes to the estimation process that were considered, proposed, recommended, or adopted by DEP as a result of the investigation, and all documents evidencing the conclusions DEP reached as a result of the investigation.

**Response:**

Please see DEP's response to Data Request No. 1-15.

Individuals who participated in the investigation and the role of and actions taken by such person:

**(1) Gary Freeman**

- *Department:* Interconnection Queue Management (DET Management)
- *Company Role:* General Manager, DET Renewable Integration and Operations (Retired from Duke Energy in Q1 2019)
- *Investigation Role:* In Q1 2018, Freeman directed DET Process, Governance, and Reporting Department employees (Donna Massengill and Beckton James) to further investigate observed discrepancies between estimated construction costs and actual construction costs for distribution interconnection projects coming online during Q4 2017.

**(2) Ken Jennings**

- *Department:* Interconnection Queue Management (DET Management)
- *Company Role:* General Manager, DET Renewable Integration and Operations (Assumed role after Freeman's retirement during Q1 2019)
- *Investigation Role:* In Q2 2019, Jennings reviewed and approved the updated cost estimate tool developed by James, Bhagat, and Andreasen for DEP and DEC distribution interconnection project facility studies. In Q3 2019, Jennings directed DET Management and DET Account Management to work with Distribution Planning and Distributed Generation to apply the updated cost estimate tool to DEP and DEC distribution interconnection projects in construction and subsequently provide updated cost estimate notices to these Interconnection Customers.

**(3) Donna Massengill**

- *Department:* DET Process, Governance, and Reporting (DET Governance & Process)
- *Company Role:* Manager, Renewable Energy Contracts & Process Governance
- *Investigation Role:* In Q1 2018, Massengill acted on direction received from Freeman to further investigate discrepancies between estimated construction costs and actual construction costs for distribution interconnection projects.

**(4) Beckton James**

- *Department:* DET Process, Governance, and Reporting (DET Governance & Process)
- *Company Role:* Senior Business and Technical Consultant
- *Investigation Role:* In Q1 2018, James assisted Massengill by compiling generation interconnection cost data to investigate discrepancies between estimated construction costs and actual construction costs for distribution interconnection projects. Also during this time, James began development on an initial version of an updated distribution system upgrade cost estimating tool based on cost data collected by James and Flowers during the final accounting process. The updated cost estimating tool was developed for potential use during distribution interconnection project facility studies conducted in DEP and DEC. In Q1 2019, James further developed and shared an early version of the updated cost estimate tool with the other departments referenced in this response. In Q2 2019, James worked with McNeil, Bhagat, and Andreasen to further develop, conduct final testing, and receive final approvals from the other departments for use of updated cost estimate tool for distribution interconnection project facility studies. In Q3 2019, James trained Distribution Planners on how to apply the updated cost estimate tool to provide distribution interconnection project costs for future facility study reports.

**(5) Scott Jennings**

- *Department:* Zone Operations CARs Coastal (Distribution Planning)
- *Company Role:* Director, CD Area Operations
- *Investigation Role:* In Q2 2019, Jennings directed Distribution Planners to use the updated cost estimate tool developed by James, McNeil, Bhagat and Andreasen for all DEP and DEC distribution interconnection project facility studies going forward. In Q3 2019, Jennings directed Distribution Planners to work with Distributed Generation and DET Account Management to apply the updated cost estimate tool to DEP and DEC distribution interconnection projects in construction.

**(6) Jeff Riggins**

- *Department:* Interconnection Queue Management (DET Management)
- *Company Role:* Director, Standard PPAs & Interconnects
- *Investigation Role:* In Q2 2019, Riggins reviewed and approved the updated cost estimate tool developed by James, Bhagat, and Andreasen for distribution interconnection project facility studies in DEP and DEC. In Q3 2019, Riggins directed DET Account Management to work with Distribution Planning and Distributed Generation to apply the updated cost estimate tool to DEP and DEC distribution interconnection projects in construction and subsequently provide updated cost estimate notices to this subset of projects.



**(7) Scott Reynolds**

- *Department:* Interconnection DEP (DET Account Management)
- *Company Role:* Manager, Interconnection PPA and Account Management
- *Investigation Role:* In Q2 2019, Reynolds reviewed and approved the updated cost estimate tool developed by James, Bhagat, and Andreasen for distribution interconnection project facility studies in DEP. In Q3 2019, Reynolds directed DEP Account Management to work with Distribution Planning and Distributed Generation to apply the updated cost estimate tool to DEP distribution interconnection projects in construction and subsequently provide updated cost estimate notices to this subset of projects

**(8) George Flowers**

- *Department:* Interconnection DEP (DET Account Management)
- *Company Role:* Renewable Contract Analyst
- *Investigation Role:* In Q3 2019, Flowers acted on direction received from Reynolds to work with Distribution Planning and Distributed Generation to apply the updated cost estimate tool to DEP distribution interconnection projects in construction. In Q4 2019, Flowers acted on direction received from Reynolds to provide updated cost estimate notices to this subset of projects

**(9) Jack McNeil**

- *Department:* Major Projects CARs (Distribution Management)
- *Company Role:* Director, Asset Management
- *Investigation Role:* In Q1 2019, McNeil reviewed an early version of James' updated cost estimate tool based on cost data collected by James and Flowers from previously prepared and delivered final accounting reports. In Q2 2019, McNeil directed Bhagat to assist James with development and subsequent adoption of the updated cost estimate tool for distribution interconnection project facility studies in DEP and DEC. Later in Q2 2019, McNeil reviewed and approved the updated cost estimate tool developed by James, Bhagat, and Andreasen for distribution interconnection project facility studies in DEP and DEC. In Q3 2019, McNeil directed Distributed Generation to work with Distribution Planning, DET Management, and DET Account Management to apply the updated cost estimate tool to DEP and DEC distribution interconnection projects in construction.

**(10) Neil Bhagat**

- *Department:* Asset Management CARs East (Distributed Generation)
- *Company Role:* Manager, Asset Management
- *Investigation Role:* In Q1 2019, Bhagat reviewed an early version of James' updated cost estimate tool based on cost data collected by James and Flowers from previously prepared and delivered final accounting reports. In Q2 2019, Bhagat acted on direction received from McNeil to assist James with development and subsequent adoption of the updated cost estimate tool for distribution interconnection project facility studies in DEP and DEC. At this same time, Bhagat directed Andreasen to also assist James with development and subsequent adoption of the updated cost estimate tool for distribution interconnection project facility studies in DEP and DEC. In Q3 2019, Bhagat acted on direction received from McNeil to work with Andreasen, Distribution Planning, DET

Management, and DET Account Management to apply the updated cost estimate tool to DEP and DEC distribution interconnection projects in construction.

**(11) Jack Andreasen**

- *Department:* Reliability Eng Car DG (Distributed Generation)
- *Company Role:* Engineering Design Associate
- *Investigation Role:* In Q2 2019, Andreasen acted on direction received from Bhagat to assist James with development and subsequent adoption of the updated cost estimate tool for distribution interconnection project facility studies in DEP and DEC. In Q3 2019, Andreasen trained Distribution Planners on how to apply the updated cost estimate tool to distribution interconnection project facility study results. In Q3 2019, Andresen acted on direction received from McNeil and worked with Bhagat, Distribution Planning, DET Management, and DET Account Management to apply the updated cost estimate tool to DEP and DEC distribution interconnection projects in construction.

**Sponsor:** George Flowers, Renewable Contract Analyst, Interconnection DEP; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

15. Identify all actions taken by DEP during the period January 1, 2015, to the present, which support DEP's contention that "it has proactively sought to update its cost estimating methodology to better reflect actual costs." Include in this response identification of any events or meetings with third parties you participated in relating to your efforts to update your cost estimating methodology.

**Response:**

DEP objects to the temporal scope of this request for "all actions taken by DEP during the period January 1, 2015, to the present" as overbroad, unduly burdensome and because actions taken by DEP prior to the date that Williams Solar submitted its Interconnection Request are not relevant and outside the scope of this proceeding, to address the cost estimating methodology and procedures employed by DEP to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

**Q1 2018**

In Q1 2018, DET Management directed DET Process to further investigate observed discrepancies between estimated construction costs and actual construction costs for distribution interconnection projects coming online during Q4 2017.

**Q2 – Q3 2018**

DET Management, DET Governance & Process, DET Account Management held meetings to review additional evidenced differences between estimated construction costs listed in project IAs and actual construction costs.

**Q4 2018**

DET Governance & Process began to explore improvements to existing estimate tools utilized for estimates provided prior to construction.

### Q1 2019

DET Governance & Process review potential updates to the cost estimate tool with Distribution Management and Distributed Generation. The tool was developed for use during the facility study phase of the interconnection study process for DEP and DEC distribution projects going forward. The updated cost estimate tool applied a multivariate analysis to accounting data documenting cost differences between estimates and actuals for 100+ vintage 2015-2018 commercially operating distribution interconnection projects in DEP and DEC.

### Q2 2019

DET Governance & Process and Distributed Generation performed final tests and began receiving necessary internal approvals to utilize the updated cost estimate tool for distribution project facility studies in DEP and DEC.

### Q3 2019

DET Governance & Process and Distributed Generation received final approvals and instruction from Distribution Management to ensure that the updated cost estimate tool was utilized for all interconnection facility studies conducted in DEP and DEC for distribution projects going forward. After DET Governance & Process and Distributed Generation trained Distribution planners on how to use the updated cost estimate tool, the planners began to use the updated cost estimate tool for all distribution project facility studies in DEP (starting July 30, 2019) and DEC (starting August 2, 2019).

Shortly after the updated cost estimate tool was approved for use during the facility study phase of the interconnection process for DEP and DEC distribution projects, DET Governance & Process, DET Management, Distribution Management, and Distributed Generation collected pertinent study and cost data for DEP and DEC distribution projects in construction and applied the updated cost estimate tool to those projects.

### Q4 2019

After applying the updated cost estimate tool to pertinent study and cost data for DEP and DEC distribution projects in construction, DET Governance & Process, DET Management, DET Account Management, Distribution Management, Distribution Planning, and Distributed Generation coordinated efforts to deliver updated cost estimate notices to those projects.

### Q1 2020

DET continues to actively monitor and assess estimated and actual costs for scopes of work involved in constructing distribution generator interconnection projects.

**Sponsor:** George Flowers, Renewable Contract Analyst, Interconnection DEP, Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

16. Identify in detail the specific source(s) of the increase in the estimate of Williams Solar's System Upgrade costs from the system impact study to the facilities study. As part of your response, identify all documents evidencing or relating to the specific increases in the estimate of Williams Solar's System Upgrade costs from the system impact study to the facilities study.

**Response:**

Please see DEP's response to Request Nos. 1-1 and 1-2.

**Sponsor:** Neil Bhagat, Manager, Asset Management/Distributed Generation, Duke Energy/  
Beckton James, Senior Business and Technical Consultant, Duke Energy

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

17. For each interconnection request for which DEP has provided a revised estimate of system upgrade and/or interconnection facilities costs since January 1, 2019, please identify (a) the date of the initial estimate; (b) the amount of such costs initially estimated; (c) the date of the revised estimate; (d) the amount of the revised estimate; (e) the date of the system impact study for such project; (f) the date of the facilities study for such project; and (g) the date DEP offered an interconnection agreement for such project.

**Response:**

Please see the file labeled “CONFIDENTIAL DR No. 1-17 Williams Solar.xls,” provided in response to Request for Production No. 1-1.

DEP will produce this information subject to a mutually-agreeable confidentiality agreement between DEP and Williams Solar. DEP has redacted all Interconnection Customer-identifiable information as confidential and/or proprietary and not subject to disclosure under the North Carolina Interconnection Procedures.

**Sponsor:** George Flowers, Contract Analyst, Interconnection DEP, Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Beckton James, Senior Business and Technical Consultant, Duke Energy; Scott Jennings, Director, Customer Delivery Area Operations; Brian Dale, Engineer III, Asset Management Distributed Generation

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

18. State whether DEP generated any estimate of the costs of the system upgrades or interconnection facilities for Williams Solar's interconnection request that was not provided to Williams Solar (including, without limitation, any DEP-internal estimate), and, if so, identify the date of the estimate and the amount of the estimate. As part of your response, identify all documents evidencing or relating to such estimate.

**Response:**

During the Facilities Study process, DEP developed multiple preliminary iterations of cost estimates prior to a final estimate being provided to Williams Solar. These iterations were based on design review feedback and clarification on protective device design requirements and were immaterial (~1% change) to the final cost estimate provided to Williams Solar in Facilities Study. There were not any scope changes of material significance identified at any time during the Facilities Study design process.

**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

19. For the Williams Solar System Impact Study and for every document produced in response to Document Request 8, describe in detail the meaning, derivation, and purpose of the phrase “ihateyou” as it relates to that document. As part of this response, identify the person who created the document and their position with the company.

**Response:**

This phrase was generated by an external contractor at Pike Engineering, who at the time was conducting the Williams Solar DER interconnection study for Duke Energy. Duke Energy has communicated the inappropriate and unprofessional nature of the filename to management at Pike Engineering, who is investigating the incident. Pike Engineering has advised that the individual responsible for the file name is no longer working on projects related to DEP distributed generation interconnection studies.

**Sponsor:** Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP, Neil Bhagat, Manager, Asset Management/Distributed Generation



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**DUKE ENERGY PROGRESS, LLC**

**Request:**

20. For the period from January 1, 2015 to the present, provide a trend comparison of line-item cost assumptions by quarter for each type listed in the Williams Solar system upgrades and interconnection facilities estimates.

**Response:**

DEP objects to this request on the grounds that it requires DEP to perform original work and requests information not readily attainable as DEP does not generate in the ordinary course “a trend comparison of line-item cost assumptions by quarter for each type listed in the Williams Solar system upgrades and interconnection facilities estimates.”

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

Trending of material related costs are not available, as these are updated in real time throughout the year based on system average costs driven by purchases and other supply chain transactions. Trending of labor rates and labor overheads is supplied in response to Data Request Nos. 21 and 22.

**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

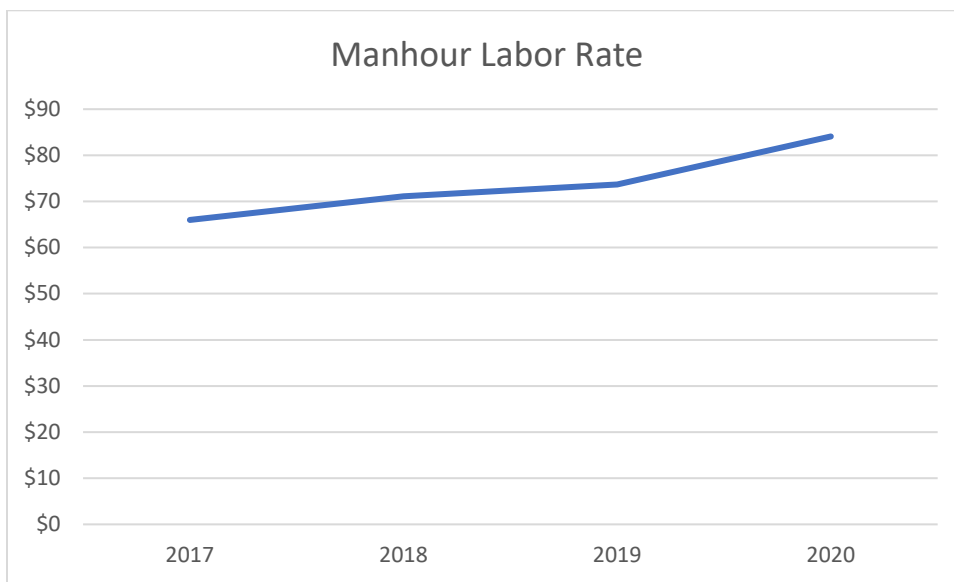
21. For the period from January 1, 2015 to the present, provide a trend comparison of labor cost assumptions for each type of cost listed in the Williams Solar system upgrades and interconnection facilities estimates.

**Response:**

DEP objects to the temporal scope of this request for information “from January 1, 2015 to the present” and further objects on the grounds that it requires DEP to perform original work and requests information not readily attainable as DEP does not generate in the ordinary course “a trend comparison of cost assumptions for each type of cost listed in the Williams Solar system upgrades and interconnection facilities estimates.”

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

Due to change in work management systems, data is only available for 2017 forward. Labor cost is estimated using a standard rate in Maximo which reflects a weighted average manhour cost for labor and equipment to perform overhead construction work.



**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

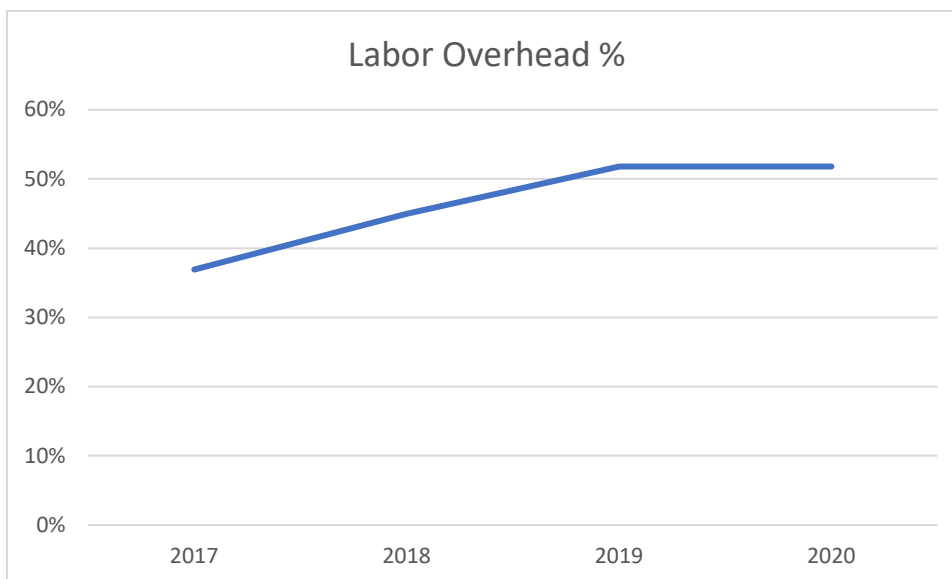
22. For the period from January 1, 2015 to the present, provide a trend comparison of overhead allocation cost assumptions per quarter.

**Response:**

DEP objects to the temporal scope of this request for information “from January 1, 2015 to the present” and further objects on the grounds that it requires DEP to perform original work and requests information not readily attainable as DEP does not generate, or have any obligation to generate, “a trend comparison of overhead cost assumptions per quarter.”

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

Due to change in work management systems, data is only available for 2017 forward. Labor overheads are estimated as a fixed percentage associated to the manhour labor rate, and are calculated by the Duke Finance organization on an annual basis. The source file associated with the below graph as well as the graph provided in response to Data Request No. 1-21 is provided in response to Request for Production No. 1-1, labeled “DR No. 1-22 and 1-23 MaximoLaborRates\_Historical.xls”



**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

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**DUKE ENERGY PROGRESS, LLC**

**Request:**

23. For the period from January 1, 2015 to the present, provide an organization chart and any changes over time for the department(s) responsible for estimating costs for standard offer projects interconnected in distribution system.

**Response:**

DEP objects to the temporal scope of this request for information “the period from January 1, 2015, to the present” as overbroad, unduly burdensome and because DEP’s “organization chart and any changes over time for the department(s) responsible for estimating costs for standard offer projects interconnected in distribution system” prior to the date that Williams Solar submitted its Interconnection Request to DEP is not relevant and outside the scope of this proceeding, as such efforts did not impact the procedures DEP employed to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

Please see the documents labeled “DR No. 1-23 DET Org 2015 to 2020.xlsx” and “DR No. 1-23 Org 1-1-2020” provided in response to Request for Production No. 1-1.

**Sponsor:** Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP

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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

1. Produce all documents and data identified in response to the foregoing interrogatories.

**Response:**

Duke objects to Complainant's request for the production of "all documents and data" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of this Response are producing responsive documents in their possession.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the documents in the folder labeled "RFP No. 1-1" on the FTP site in response to this request.

**Sponsor:** See interrogatories.

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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

2. Produce all documents and data generated in the process of creating the Preliminary Estimated Upgrade Charge for Williams Solar.

**Response:**

Duke objects to Complainant's request for the production of "all documents and data" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify Company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the documents in the folder labeled "RFP No. 1-2" on the FTP site in response to this request.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Neil Bhagat, Manager, Asset Management/Distributed Generation



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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

3. Produce all documents and data generated in the process of creating the System Upgrades and Interconnection Facilities costs for Williams Solar.

**Response:**

Duke objects to Complainant's request for the production of "all documents and data" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the documents provided in response to Request for Production No. 1-2 in response to this request.

**Sponsor:** Beckton James, Senior Business and Technical Consultant, Duke Energy; Scott Jennings, Director, Customer Delivery Area Operations; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP

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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

4. Produce all documents and data (including, without limitation, communications, reports, and presentations) evidencing, reflecting, or discussing the investigation referred to in DEP's Answer and Motion to Dismiss.

**Response:**

Duke objects to Complainant's request for the production of "all documents and data" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the documents in the folder labeled "RFP No. 1-4" on the FTP site in response to this request.

**Sponsor:** Beckton James, Senior Business and Technical Consultant, Duke Energy; Neil Bhagat, Manager, Asset Management/Distributed Generation, Duke Energy; George Flowers, Account Manager, Interconnection; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Jeff Riggins, Director, Standard PPAs & Interconnects; Donna Massengill, Manager, Renewable Energy Contracts & Process Governance.

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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

5. Produce all documents evidencing any written policy, guidelines, procedures, or methodologies of DEP in effect during the period January 1, 2015 to the present, relating to the generation of estimated costs for system upgrades or interconnection facilities in connection with system impact studies.

**Response:**

Duke objects to Complainant's request for the production of "all documents" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

DEP further objects to the temporal scope of this request for "all documents evidencing any written policy, guidelines, procedures, or methodologies of DEP in effect during the period from January 1, 2015, to the present" as overbroad, unduly burdensome and because DEP's "written policy, guidelines, procedures, or methodologies of DEP in effect" prior to the date that Williams Solar submitted its Interconnection Request to DEP are not relevant and outside the scope of this proceeding, as such policies and procedures did not impact the procedures DEP employed to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the documents in the folder labeled "RFP No. 1-5" on the FTP site in response to this request.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation; Neil Bhagat, Manager, Asset Management/Distributed Generation; Jack McNeil, Director, Asset Management; Dmitri Moundous, Senior Engineer, Asset Management/Distributed Generation

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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

6. Produce all documents evidencing any written policy, guidelines, procedures, or methodologies of DEP in effect during the period January 1, 2015 to the present, relating to the generation of estimated costs for system upgrades or interconnection facilities in connection with a facilities study, including, without limitation, any policy, guideline, procedure, or methodology regarding the use of Maximo in producing such estimates.

**Response:**

Duke objects to Complainant's request for the production of "all documents" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

DEP further objects to the temporal scope of this request for "all documents evidencing any written policy, guidelines, procedures, or methodologies of DEP in effect during the period from January 1, 2015, to the present" as overbroad, unduly burdensome and because DEP's "written policy, guidelines, procedures, or methodologies of DEP in effect" prior to the date that Williams Solar submitted its Interconnection Request to DEP are not relevant and outside the scope of this proceeding, as such policies and procedures did not impact the procedures DEP employed to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the documents in the folder labeled "RFP No. 1-6" on the FTP site in response to this request.

**Sponsors:** Scott Jennings, Director, Customer Delivery Area Operations; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Beckton James, Senior Business and Technical Consultant

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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

7. Produce all documents evidencing any written policy, guidelines, procedures, or methodologies of DEP in effect during the period January 1, 2015 to the present, relating to the generation of estimated costs for system upgrades or interconnection facilities in connection with interconnection requests other than the estimated costs provided to interconnection customers.

**Response:**

Duke objects to Complainant's request for the production of "all documents" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

DEP further objects to the temporal scope of this request for "all documents evidencing any written policy, guidelines, procedures, or methodologies of DEP in effect during the period from January 1, 2015, to the present" as overbroad, unduly burdensome and because DEP's "written policy, guidelines, procedures, or methodologies of DEP in effect" prior to the date that Williams Solar submitted its Interconnection Request to DEP are not relevant and outside the scope of this proceeding, as such policies and procedures did not impact the procedures DEP employed to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see documents produced in response to Request for Production No. 1-6.

**Sponsors:** Scott Jennings, Director, Customer Delivery Area Operations; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Beckton James, Senior Business and Technical Consultant

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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

8. For the period from January 1, 2015 to the present, produce all documents in any format containing the phrase “ihateyou” (without the quotation marks) in the file name or in any other metadata field. For each document produced, include all reasonably accessible metadata including, without limitation, the date sent, date received, author, and recipients.

**Response:**

Duke objects to Complainant’s request for the production of “all documents” for the reasons more fully stated in in DEP’s General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a “sponsor” of DEP’s Response to this request are producing responsive documents in their possession.

DEP further objects to the temporal scope of this request for all documents “for the period from January 1, 2015 to the present” as overbroad, unduly burdensome and because this information is not relevant and outside the scope of this proceeding, as any such documents did not impact the procedures DEP employed to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP refers Williams Solar to the Company’s Response to Request No. 1-19.

**Sponsor:** Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Neil Bhagat, Manager, Asset Management/Distributed Generation

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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

9. For the period from January 1, 2015 to the present, produce all system upgrade and interconnection facility cost estimates for distribution interconnection projects, including, without limitation, all initial cost estimates, final estimates, and final invoices for completed work.

**Response:**

Duke objects to Complainant's request for the production of "all documents" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

DEP objects to the temporal scope of this request for all documents for "the period from January 1, 2015, to the present" as overbroad, unduly burdensome and further objects because "all system upgrade and interconnection facility cost estimates for distribution interconnection projects, including, without limitation, all initial cost estimates, final estimates, and final invoices for completed work" for other Interconnection Customers are proprietary to such other Interconnection Customers and not relevant to the system upgrades or interconnection facilities cost estimates for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the document labeled "CONFIDENTIAL DEP Final Accounting Report Tracker Q3 2018-Current," in the folder labeled RFP No. 1-9 on the FTP site, which provides a summary of cost estimates and actual costs for those DEP projects that received a FAR.

DEP will produce this information subject to a mutually-agreeable confidentiality agreement between DEP and Williams Solar. DEP has redacted all Interconnection Customer-identifiable information as confidential and/or proprietary and not subject to disclosure under the North Carolina Interconnection Procedures.



**Sponsor:** George Flowers, Account Manager, Interconnection; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Beckton James, Senior Business and Technical Consultant, Duke Energy; Beckton James, Senior Business and Technical Consultant, Duke Energy; Scott Jennings, Director, Customer Delivery Area Operations

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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

10. Produce all contracts for construction of interconnection facilities and system upgrades for the period January 1, 2015.

**Response:**

Duke objects to Complainant's request for the production of "all contracts" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

DEP objects to the temporal scope of this request for all documents for "the period from January 1, 2015" as vague, overbroad, unduly burdensome and further objects because "all construction contracts" unduly vague and ambiguous.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

DEP's master construction agreements require notice and consent to produce these Agreements. DEP is in the process of obtaining consent and anticipates supplementing this Response to produce these agreements on or before February 28, 2020. Production of these agreements shall also be subject to execution of a mutually-agreeable confidentiality agreement between DEP and Williams Solar.

**Sponsor:** Genevieve Bestercy, Sourcing Specialist, Transmission and Generation Grid Solutions Labor and EPC

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Williams Solar RFP No. 1  
Item No. 1-11  
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**DUKE ENERGY PROGRESS, LLC**

**DOCUMENT REQUESTS**

**Request for Production:**

11. Produce all Williams Solar comments and communication history within Salesforce (or other data/document collection IT system) used to control data/document records, coordination, email history, etc. generated or received by Duke within the study process.

**Response:**

Duke objects to Complainant's request for the production of "all Williams Solar comments and communication history" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the documents in the folder labeled "RFP No. 1-11" on the FTP site in response to this request.

**Sponsor:** George Flowers, Account Manager, Interconnection; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP

Dated: February 21, 2020.

/s/E. Brett Breitschwerdt

E. Brett Breitschwerdt  
McGuireWoods LLP  
501 Fayetteville Street, Suite 500  
PO Box 27507 (27611)  
Raleigh, North Carolina 27601  
Telephone: (919) 755-6563  
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Telephone: (919) 546-3257  
*Jack.Jirak@duke-energy.com*

*Attorneys for Duke Energy Progress,  
LLC*

**CERTIFICATE OF SERVICE**

There undersigned, of the law firm McGuireWoods LLP, hereby certifies that he has served a copy of the foregoing Duke Energy Progress, LLC Responses to Williams Solar, LLC's First Data Request via electronic mail to:

Marcus Trathen  
Eric M. David  
Brooks, Pierce , McLendon, Humphrey, & Leonard LLP  
Suite 1700, Wells Fargo Capitol Center  
150 Fayetteville Street  
P.O. Box 1800 (zip 27602)  
Raleigh NC 27610

This the 21<sup>st</sup> day of February, 2020.

/s/E. Brett Breitschwerdt

E. Brett Breitschwerdt  
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*Attorney for Duke Energy Progress, LLC*



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Item No. 1-1  
Page 1 of 2**DUKE ENERGY PROGRESS, LLC****Request:**

1. Provide the entire basis for DEP's initial estimate of \$774,000, including, without limitation, an itemization of all costs included in that estimate and any overhead amounts assumed in that estimate. As part of your response, identify all documents evidencing or relating to the estimate.

**Response:**

Each generator interconnection project's preliminary estimated upgrade cost projections developed by DEP in the System Impact Study are calculated based on a standardized template cost estimation tool, SIS Estimate Tool Rev1, as further discussed in the Company's response to Williams Solar's Request Nos. 1-7 and 1-8. The SIS Estimate Rev1 is the most updated version of the SIS Estimate Tool Rev0. Further explanation of the process DEP uses to estimate costs is provided in DEP's response to Data Request No. 1-3.

The System Modifications project file used to generate preliminary estimated upgrade costs for Williams Solar is being produced in response to Request for Production No. 1-2, and is labeled "Williams Solar Estimation Tool SIS.xls." Labor, materials, and overhead are included in the \$774,000 estimate based on work management data available as of the issuance date of the System Impact Study report for Williams Solar.

**Sponsor:** Neil Bhagat, Manager, Asset Management/Distributed Generation, Duke Energy

**Supplemental Response:**

In response to Williams Solar's March 6, 2020 letter, DEP clarifies its initial Response to confirm that the System Impact Study estimated costs delivered to Williams Solar were generated using SIS Estimation Tool Rev0, more specifically a template called "SIS Estimation Tool Rev0.1." In response to Williams Solar's question regarding the Williams Solar System Impact Study files produced in Request for Production No. 1-2 resembling the Rev1 file and not the Rev0 file, cosmetic changes were made to "SIS Estimation Tool Rev0" by Pike Engineering to make the spreadsheet more user friendly. These can be seen in the spreadsheet template titled "SIS Estimation Tool Rev0.1" now being produced in response to Request for Production No. 1-2

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(Supplemental). The adjustment factors and line item costs are unchanged from those represented in “SIS Estimation Tool Rev0.” The “SIS Estimation Tool Rev0.1” file is the template used to create the Williams Solar System Impact Study estimate as well as all other distribution System Impact Study estimates from 2016 to June 2019. DEP is also providing additional explanation of the System Impact Study files produced in a supplemental response to Request for Production No. 1-2.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation



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Page 1 of 5**DUKE ENERGY PROGRESS, LLC****Request:**

3. With respect to the cost data relied upon by DEP in generating cost estimates for interconnection customers, state (a) how the cost data were estimated, (b) who performed the estimation, and (c) whether they reflect competitive bidding prices for parts, equipment, and labor.

**Response:**

Generator Interconnection cost estimates are generated in two phases corresponding to the System Impact Study and Facilities Study processes:

First, the System Impact Study estimated cost are based on reviewing the upgrades identified in the System Impact Study Report with the existing conditions and any current proposed non-DER upgrades in the DEP Graphical Information System (GIS) and a per mile cost estimation sheet. The SIS Estimation Tool Rev0 (which is being produced in DEP's response to Request for Production of Documents No. 5), has typical system upgrade project cost estimates on a per mile basis. These estimated cost data inputs to the cost estimate sheet were developed by the Capacity Planning Department based on overhead distribution line construction completed in DEP on a per mile cost basis. This cost estimation sheet is utilized to estimate costs for both internal overhead distribution line construction projects, as well as System Impact Study estimates for generator interconnections. The Capacity Planning Department also more recently developed the SIS Estimation Tool Rev0 based on completed projects. The cost data relied upon by DEP in generating cost estimates in the cost estimate tool is based upon the following categories of procured costs:

- a. Overhead Contractors (Labor/Equipment) – The contractors completing those projects were selected on a competitive basis and were required to satisfy DEP's qualifications including safety, construction quality, presence in our region, ability to scale, cost and other factors.
- b. Material/Parts – Duke obtains competitive pricing for material purchases and performs a technical and commercial evaluation to determine the best overall evaluated pricing to select an approved supplier or in many cases multiple suppliers. Duke periodically reviews market conditions to assess indices relative to raw material cost and perform cost modeling for approved price adjustments.
- c. Engineering Labor - Pike Engineering is an engineering contractor for both Duke Energy Progress and Duke Energy Carolinas. Their rates for engineering labor were competitively bid.

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Second, the detailed cost estimate provided in the Facilities Study is developed by Duke's Major Projects design organization, either by a Duke Energy Engineering Technologist, or by an offsite contract engineering partner such as Pike Engineering, with final review by a Duke Energy Engineering Technologist. This design process is completed in Maximo, which is used in conjunction with a MicroStation based graphical design tool, Bentley Open Utilities Designer (BOUD), for the development of schedulable tasks, bills of material, and cost estimates. This process is used for all types of Distribution construction work, including Customer Additions, Capital Maintenance, System Improvements, as well as generator interconnections. Compatible units are used as the basis for the design process, specifically for purposes of developing an estimate of the materials and labor hours required to perform the scope of work for a given design.

DEP began using the Maximo and BOUD tools for work order design and estimation in November 2017. Prior to this date, DEP used a similar system called Work Management Information System (WMIS), developed by CGI, for the same purposes. WMIS also utilized a compatible unit process in order to develop estimates of material and labor hours.

In both systems, the process of using compatible units to develop the design and cost estimate involves selection of compatible units, which represent the scope of work being performed. The compatible unit library used in both systems contained a combination of material only compatible units, labor only compatible units, and combination material/labor compatible units. The selection process for compatible units is based on the currently published Distribution Standards manual, which specifies the materials and equipment used for approved styles of installations.

Most compatible units on a design are associated with primary material items used, such as poles, conductor, switches, etc. Each of these compatible units captures what material item numbers and how many labor hours are required to perform the work associated with the compatible unit. Material only compatible units are less common, and associated with minor items such as hardware and connectors in which the labor hours are associated with a higher-level compatible unit. Finally, labor only compatible units are added to a design to capture anticipated labor time that is not reflected in a material only compatible units. Examples of labor-only compatible units are hand digging for poles or anchors, transferring conductor, and laying wire out for reconductors.

In addition to the material and labor compatible units noted above, designers have an opportunity to include "cost adder" compatible units to account for unique costs not associated with standard construction. Examples of when cost adder compatible units might be used are environmental permitting, controls and/or remediation, or other civil work such as asphalt/concrete removal or remediation.

Once a designer has tabulated the list of compatible units associated with a design for the given scope of work, they perform a step called "estimation" which calculates the total material and labor costs for the design. The design cost estimate is based on the following components: direct material

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costs, material overheads, direct labor costs, and labor overheads. Labor costs are described in more detail in the Company's responses to Request Nos. 1-4 and 1-10. Material costs are estimated based on near real-time system average costs. Duke obtains competitive pricing for material purchases and performs both a technical and commercial evaluation to determine the best overall evaluated pricing to select an approved supplier or in many cases multiple suppliers before executing contracts. Periodically, a review of market conditions is performed to assess indices relative to raw material cost and perform cost modeling for approved price adjustments.

Following development of the Maximo cost estimate, generator interconnection projects are then run through a secondary cost estimation tool, the Revised Estimating Tool ("RET"), which was developed to help provide more accurate cost to customers based on actual construction costs. A detailed explanation of this revised cost estimating tool, labeled "DR No. 1-3 Revised Estimating Tool Description – Williams Solar.doc," is being produced in Request for Production of Documents No. 1.

The RET updates the existing cost produced in Maximo to more accurately reflect total project costs Duke will likely incur from completion of Facilities Study through completion of interconnection-related project construction. The primary adjustments made by the RET are accounting for increased future costs by projecting inflation-impacted labor, material and equipment costs, modeling more likely resourcing and equipment requirements and adding a contingency factor for unforeseen events that have historically increased costs for generator interconnection projects.

### **Supplemental Response:**

In response to Williams Solar's March 6, 2020 letter, DEP clarifies its initial Response to explain that the document labeled "DR No. 1-3 Revised Estimating Tool Description – Williams Solar.doc," was not the actual System Impact Study output file created by Pike Engineering for Williams Solar. The actual System Impact Study output files were initially produced in response to Request for Production No. 1-2 and are further explained in DEP's Supplemental Response to Request for Production No. 1-2.

Further, the difference between the estimated Interconnection Facilities costs identified in "DR No. 1-3 Revised Estimating Tool Description – Williams Solar.doc" (\$121,024) and the \$196,495 identified in Williams Solar's System Impact Study Report are primarily attributable to metering, commissioning costs, overheads and taxes being separately identified in DR No. 1-3 Revised Estimating Tool Description – Williams Solar.doc but included in the total Interconnection Facilities cost figure of \$196,495, as provided below. DEP has also determined that a minor discrepancy in flagging was incorrectly added in the Revised Estimating Tool calculation of Interconnection Facilities costs presented in DR No. 1-3 Revised Estimating Tool

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Description – Williams Solar.doc. The Revised Estimating Tool Description should have shown \$116,419 as a baseline Interconnection Facilities construction cost estimate.

The table below explains the difference between \$116,419 and \$196,495.

Item Description	Estimated Installed Cost
1. Estimated Construction cost	\$116,419.10
2. Estimated Metering cost	\$25,097.51
3. Standard Metering Cost Credit	\$(306.21)
4. Subtotal of Estimated Interconnection Facilities	\$141,210.40
5. Applicable NC Utility Sales Tax (7%) to Estimated Interconnection Facilities	\$9,884.73
6. Overhead costs (processing, technology, oversight, management)	\$20,000.00
7. Applicable NC Utility Sales Tax (7%) to Overhead Costs	\$1,400.00
8. Subtotal of Taxable costs	\$172,495.13
9. Estimated NC Advanced Energy Commissioning Costs (Average = \$24,000)	\$24,000.00
10. Estimated Total of Interconnection Costs	\$196,495.13
11. Estimated Customer MFC (.4% Monthly Facilities Charge under the Contributory Plan) 7% NC Utility Sales Tax to be applied on invoice	\$564.84
12. Estimated Customer MFC (1.0% Monthly Facilities Charge under the Non-Contributory Plan) 7% NC Utility Sales Tax to be applied on invoice	\$1,412.10

Note also that the Revised Estimating Tool was not used to develop the SIS estimate provided to Williams Solar.

Finally, DEP clarifies its response to Request No. 1-3 to confirm that the Capacity Planning Department developed “SIS Estimation Tool Rev0” and provided it to Pike Engineering in 2015. This tool was created using completed distribution work orders completed prior to 2015. In June 2019, the Duke Energy Distributed Generation Team updated the spreadsheet to “SIS Estimation Tool Rev1.” This update was implemented to more accurately estimate system upgrade costs.

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**Sponsors:** Brian Dale, Engineer III, Asset Management Distributed Generation; Beckton James, Senior Business and Technical Consultant, Duke Energy; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP

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Item No. 1-5  
Page 1 of 2**DUKE ENERGY PROGRESS, LLC****Request:**

5. Describe in detail the process used to create the Preliminary Estimated Upgrade Charge provided to Williams Solar. As part of your response, identify (a) all individuals who participated or otherwise assisted in creating the Preliminary Estimated Upgrade Charge provided to Williams Solar, LLC and the role of and actions taken by such person; and (b) all documents or data reflecting or evidencing the estimate.

**Response:**

A study engineer is responsible for creating the Preliminary Estimated Upgrade Charge for the System Impact Study Report. The study engineer reviewed the project under the DEP's System Impact Study evaluation process, which is described in a file labeled "System Impact Study SOP.pdf" being produced in DEP's response to Request for Production of Documents No. 5. Based upon this review, the study engineer then identified necessary upgrades required to safely and reliably interconnect the Williams Solar facility. The identified upgrades were then itemized and entered into the System Impact Study cost estimation spreadsheet by the study engineer, as further described in DEP's response to Data Request No. 1-3. Within the cost estimation spreadsheet, each upgrade was assigned a cost. The total upgrades cost was then calculated.

For Williams Solar, the study engineer responsible for developing the Preliminary Estimated Upgrade Charge included in the System Impact Study Report was a Pike Engineering Employee. Duke Energy Engineers review portions of the System Impact Study and provide approval for their department. Capacity Planner Alex Winslow reviewed the voltage and RVC study. Distribution Protection and Control engineer Andrew Kurczek (Pike Engineering) reviewed the protection study. The system upgrades necessary to safely and reliably interconnection the facility are identified through the voltage, RVC, and Protection studies. The two engineers mentioned above reviewed the accuracy of the study and confirmed the preliminarily-identified upgrades are needed, but do not estimate the cost for the identified system upgrades. The standardized cost estimation tool used to generate preliminary estimated upgrade costs for Williams Solar is further described in response to Request Nos. 1-1 and 1-3, and is being produced in response to Request for Production of Documents No. 5.

**Sponsor:** Neil Bhagat, Manager, Asset Management/Distributed Generation; Dmitri Moundous, Senior Engineer, Asset Management/Distributed Generation

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Item No. 1-5  
Page 2 of 2**Supplemental Response:**

In response to Williams Solar's March 6, 2020 letter, DEP clarifies its initial Response to identify the "Pike Engineering Employee" responsible for developing the Preliminary Estimated Upgrade Charge included in the System Impact Study Report. To the best of DEP's knowledge, the following Pike engineers worked on the Williams Solar Interconnection Request and contributed approximately 90% of the work to complete the Williams Solar System Impact Study.

<b>Name (Last, First)</b>
Wickstrom, Nikala
Anttila, Konsta
Willin, Wade
Garcia, Eduardo
Witherspoon, Jeffrey

**Sponsor:** Neil Bhagat, Manager, Asset Management/Distributed Generation, Brian Dale, Engineer III, Asset Management Distributed Generation

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Williams Solar Data Request No. 1  
Item No. 1-6  
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**DUKE ENERGY PROGRESS, LLC**

**Request:**

6. Identify by line item type the “historic cost data for similar projects,” if any, used by DEP in developing the Preliminary Estimated Upgrade Charge. As part of your response, identify the project(s) for which such data was acquired and the period during which the upgrades for such project(s) were constructed.

**Response:**

The creation of the “SIS Estimation Tool Rev0” tool originated in work order designs created in the late 1990’s or early 2000’s for general distribution work. Sometime between 2000 and 2005, the work orders were converted to the Work Management Information System (WMIS) and the format of the “SIS Estimation Tool Rev0” tool was developed. Work orders were created in WMIS on various types of construction needed to complete System Improvement projects. The work orders were based upon generic work orders historically and were initially refreshed annually through a labor intensive manual process. Each year, if a new type of System Upgrade was needed, a new work order would be created to cover the need. These work orders correspond to “historic cost data for similar projects” referenced in DEP’s Answer.

In recent years, an adjustment factor was added to the SIS Estimation Tool Rev0 to increase labor costs based experienced changes in labor expense. As more time passed between the latest revision of the estimates used to feed the tool and the application of the tool, a decision was made to increase the base labor factor to keep up with rising labor charges.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation; Neil Bhagat, Manager, Asset Management/Distributed Generation; Jack McNeil, Director, Asset Management Dmitri Moundous, Senior Engineer, Asset Management/Distributed Generation



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**Supplemental Response:**

In response to Williams Solar's March 6, 2020 letter, DEP clarifies its initial Response to confirm that adjustment factors were added prior to 2015 and in June 2019. From the time Pike Engineering received the SIS Estimation Tool Rev0 in 2015 through June 2019, no changes were made in the form of adjustment factors, or line item costs. Cosmetic changes were made for the purposes of ease of use as explained in DEP's supplemental response to Request No. 1-1; however, line item costs and adjustment factors remained the same.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation

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Item No. 1-9  
Page 1 of 2**DUKE ENERGY PROGRESS, LLC****Request:**

9. For the period 2015 to the present, describe any difference between DEP's process for estimating costs of constructing upgrades necessary for interconnection of independent generation (i.e., PURPA qualified facilities) and DEP's process for estimating DEP's own construction costs (i.e., for system modifications including for interconnection of DEP's own generation facilities or other system modifications undertaken by DEP), including, without limitation, (a) identifying any difference in the estimation of the cost of parts, labor, and overheads; and (b) identifying any difference in the actual cost of parts, labor, overheads, and labor rates for such projects.

**Response:**

DEP objects to the temporal scope of this request "for the period January 1, 2015 to the present" as overbroad, unduly burdensome and because "any difference between DEP's process for estimating costs of constructing upgrades necessary for interconnection of independent generation (i.e., PURPA qualified facilities) and DEP's process for estimating DEP's own construction costs (i.e., for system modifications including for interconnection of DEP's own generation facilities or other system modifications undertaken by DEP)," having occurred prior to the date that Williams Solar submitted its Interconnection Request to DEP is not relevant and outside the scope of this proceeding, as such differences have no effect on the procedures employed by DEP to generate estimates of the cost of system upgrades or interconnection facilities for Williams Solar.

Notwithstanding the foregoing objection, DEP provides the following information in response to this request:

DEP utilizes the same design and cost estimating process (use of Maximo and common design standards) for all Distribution construction projects that is used for estimating costs of construction upgrades necessary for interconnection of independent generation (i.e. PURPA qualifying facilities) and DEP's own construction costs (i.e., for system modifications including for interconnection of DEP's own generation facilities or for customer addition, reliability improvement or other system modifications undertaken by DEP). Specifically, DEP utilizes Maximo for both independent generation and DEP-owned projects, as further described in the Company's response to Data Request No. 1-3. However, as described in DEP's response to Request No. 1-3, DEP has also integrated a generator interconnection-specific Revised Estimating Tool as part of the Facilities Study process. A similar mechanism is utilized for NCDOT requested

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relocations, in which a Maximo design estimate is run through a secondary estimating tool that was developed based on actual costs experienced for NCDOT requested projects.

**Sponsor:** Scott Jennings, Director, Customer Delivery Area Operations

**Supplemental Response:**

In response to Williams Solar's March 6, 2020 letter, DEP clarifies its initial Response to confirm that DEP has used the same methodology to estimate the cost of parts, labor and overheads for all construction projects (DEP-owned generation subject to the NC Interconnection Procedures, 3<sup>rd</sup> party generation, as well as retail, commercial, industrial and governmental load customers) since January 1, 2015. Several of the tools have been changed or modified during that timeframe including the change of the work management tool from WMIS to Maximo.

**Sponsor:** Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP

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Item No. 1-2  
Page 1 of 2**DUKE ENERGY PROGRESS, LLC****DOCUMENT REQUESTS****Request for Production:**

2. Produce all documents and data generated in the process of creating the Preliminary Estimated Upgrade Charge for Williams Solar.

**Response:**

Duke objects to Complainant's request for the production of "all documents and data" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify Company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the documents in the folder labeled "RFP No. 1-2" on the FTP site in response to this request.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Neil Bhagat, Manager, Asset Management/Distributed Generation

**Supplemental Response:**

In response to Williams Solar's March 6, 2020 letter, DEP provides the following supplemental explanation of the documents produced in response to Request for Documents No. 1-2:

"CONFIDENTIAL Project 15007 System Impact Study Calculations with A" – This document was provided to show the documentation that goes into each System Impact Study. This spreadsheet is Williams Solar-specific information and is used to determine the "system modifications" (e.g., required upgrades) during the voltage and RVC portion of the System Impact Study.

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“CONFIDENTIAL DEP Protection V2.4.2” – This document was provided to show the system, protection-related upgrades and provides the data that leads to those required system upgrades and associated costs identified in the System Impact Study report provided to Williams Solar.

“Williams Solar Estimation Tool SIS” – This spreadsheet is a tab saved as its own individual file taken out of the “CONFIDENTIAL Project 15007 System Impact Study Calculations with A” spreadsheet for the purposes of providing a quick look at the voltage and RVC portion cost estimation.

“CONFIDENTIAL Project 15007 System Impact Study Calculations - Project A and B 2017 (002)” – This spreadsheet was provided to show a preliminary 2017 version of the study calculations initially developed during System Impact Study. This file was superseded by the “CONFIDENTIAL Project 15007 System Impact Study Calculations with A” file used to develop the System Impact Study for Williams Solar.

**Sponsor:** Brian Dale, Engineer III, Asset Management Distributed Generation

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Page 1 of 2**DUKE ENERGY PROGRESS, LLC****DOCUMENT REQUESTS****Request for Production:**

4. Produce all documents and data (including, without limitation, communications, reports, and presentations) evidencing, reflecting, or discussing the investigation referred to in DEP's Answer and Motion to Dismiss.

**Response:**

Duke objects to Complainant's request for the production of "all documents and data" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

Please see the documents in the folder labeled "RFP No. 1-4" on the FTP site in response to this request.

**Sponsor:** Beckton James, Senior Business and Technical Consultant, Duke Energy; Neil Bhagat, Manager, Asset Management/Distributed Generation, Duke Energy; George Flowers, Account Manager, Interconnection; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Jeff Riggins, Director, Standard PPAs & Interconnects; Donna Massengill, Manager, Renewable Energy Contracts & Process Governance.

**Supplemental Response:**

In response to Williams Solar's March 6, 2020 letter, the sponsors identified in the initial Response have again reviewed their accessible documents for documents responsive to this Request. DEP has now also included all current employees identified in Response 1-14 as Sponsors in this supplemental response. DEP provides the following supplemental response to this request:

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Please see the documents in the folder labeled “RFP No. 1-4 (Supplemental)” on the FTP site.

**Sponsor:** Beckton James, Senior Business and Technical Consultant, Duke Energy; Neil Bhagat, Manager, Asset Management/Distributed Generation, Duke Energy; George Flowers, Account Manager, Interconnection; Scott Reynolds, Manager of Interconnections and Standard PPAs, DEP; Jeff Riggins, Director, Standard PPAs & Interconnects; Donna Massengill, Manager, Renewable Energy Contracts & Process Governance; Ken Jennings, General Manager, DET Renewable Integration and Operations, Scott, Jennings, Customer Delivery Area Operations, Jack McNeil, Director, Asset Management, Jack Andreasen, Engineering Design Associate

Docket No. E-2, Sub 1220  
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Page 1 of 2**DUKE ENERGY PROGRESS, LLC****DOCUMENT REQUESTS****Request for Production:**

10. Produce all contracts for construction of interconnection facilities and system upgrades for the period January 1, 2015.

**Response:**

Duke objects to Complainant's request for the production of "all contracts" for the reasons more fully stated in DEP's General Objection No. 5. Duke has undertaken reasonable efforts to identify company personnel with knowledge of, or otherwise likely to have custody of documents responsive to this Request and the individual(s) identified as a "sponsor" of DEP's Response to this request are producing responsive documents in their possession.

DEP objects to the temporal scope of this request for all documents for "the period from January 1, 2015" as vague, overbroad, unduly burdensome and further objects because "all construction contracts" unduly vague and ambiguous.

Notwithstanding the foregoing objection, DEP provides the following documents in response to this request:

DEP's master construction agreements require notice and consent to produce these Agreements. DEP is in the process of obtaining consent and anticipates supplementing this Response to produce these agreements on or before February 28, 2020. Production of these agreements shall also be subject to execution of a mutually-agreeable confidentiality agreement between DEP and Williams Solar.

**Sponsor:** Genevieve Bestercy, Sourcing Specialist, Transmission and Generation Grid Solutions Labor and EPC

**Supplemental Response:**

Please see DEP's operative master construction agreements and supporting agreements being produced in response to Request for Production No. 1-10. Pursuant to the Confidentiality Agreement dated February 21, 2020 between DEP and Williams Solar, the Company has redacted pricing information that would otherwise be designated as Highly Confidential Information.



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Williams Solar RFP No. 1  
Item No. 1-10  
Page 2 of 2

**Sponsor:** Genevieve Bestercy, Sourcing Specialist, Transmission and Generation Grid Solutions Labor and EPC

**Second Supplemental Response:**

In response to Williams Solar's March 6, 2020 letter, DEP is producing unredacted copies of the Company's operative master construction agreements and supporting agreements as CONFIDENTIAL documents in response to Request for Production No. 1-10, pursuant to the Confidentiality Agreement dated February 21, 2020 between DEP and Williams Solar.

**Sponsor:** Genevieve Bestercy, Sourcing Specialist, Transmission and Generation Grid Solutions Labor and EPC; Brett Breitschwerdt, McGuireWoods LLP

In providing the foregoing Supplemental Responses, DEP reserves and does not waive the right to further supplement or amend its responses as may be necessary.

Dated: March 20, 2020.

/s/E. Brett Breitschwerdt  
E. Brett Breitschwerdt  
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*Attorneys for Duke Energy Progress,  
LLC*

**CERTIFICATE OF SERVICE**

There undersigned, of the law firm McGuireWoods LLP, hereby certifies that he has served a copy of the foregoing Duke Energy Progress, LLC's Supplemental Responses to Williams Solar, LLC's First Data Request via electronic mail to:

Marcus Trathen  
Eric M. David  
Brooks, Pierce , McLendon, Humphrey, & Leonard LLP  
Suite 1700, Wells Fargo Capitol Center  
150 Fayetteville Street  
P.O. Box 1800 (zip 27602)  
Raleigh NC 27610

This the 20<sup>th</sup> Day of March, 2020.

/s/E. Brett Breitschwerdt

E. Brett Breitschwerdt  
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*Attorney for Duke Energy Progress, LLC*



Docket No. E-2, Sub 1220

Williams Solar, LLC

Burke Exhibit JB-11

SIS Estimation Tool Rev1

*Produced by DEP in Response to Williams Solar's  
Interrogatory No. 7*

#	Action	From DIS#	To DIS#	Distance (Miles)	Existing # of phases	Existing Conductor	New # of phases	New Conductor	Estimated Cost	Description
1	None					None		None	\$0.00	0
2	None					None		None	\$0.00	0
3	None					None		None	\$0.00	0
4	None					None		None	\$0.00	0
5	None					None		None	\$0.00	0
6	None					None		None	\$0.00	0
7	None					None		None	\$0.00	0
8	None					None		None	\$0.00	0
9	None					None		None	\$0.00	0
10	None					None		None	\$0.00	0

**Total Cost Estimate: \$0.00**

Library

Code	Actions	Conductor Types
1	None	None
2	Build New Line	1/0 ACSR
3	Reconductor	4/0 ACSR
4	Double Circuit	#2 ACSR
5	Triple Circuit	#2 BC
6	Add G&W at Takeoff	#4 BC
7	Verify for High Capacity	477 AAC
8		750 MCM Underground
9		
10		
11		

Neutral Conductor: 1/0 AAAC

Pricing

Action	Existing # of phases	Existing Conductor	New # of phases	New Conductor	\$/mile
Build New Line	0	None	3	477 AAC	\$256,036.99
Reconductor	1	1/0 ACSR	3	477 AAC	\$247,683.87
Reconductor	1	4/0 ACSR	3	477 AAC	
Reconductor	1	#2 ACSR	3	477 AAC	\$270,588.16
Reconductor	1	#2 BC	3	477 AAC	
Reconductor	1	#4 BC	3	477 AAC	\$266,894.93
Reconductor	1	477 AAC	3	477 AAC	
Reconductor	2	1/0 ACSR	3	477 AAC	\$246,100.45
Reconductor	2	4/0 ACSR	3	477 AAC	
Reconductor	2	#2 ACSR	3	477 AAC	\$268,988.30
Reconductor	2	#2 BC	3	477 AAC	
Reconductor	2	#4 BC	3	477 AAC	\$272,815.38
Reconductor	2	477 AAC	3	477 AAC	
Reconductor	3	1/0 ACSR	3	477 AAC	\$250,342.87
Reconductor	3	4/0 ACSR	3	477 AAC	\$250,432.94
Reconductor	3	#2 ACSR	3	477 AAC	\$291,782.93
Reconductor	3	#2 BC	3	477 AAC	\$291,782.93
Reconductor	3	#4 BC	3	477 AAC	\$291,602.78
Double Circuit	1	1/0 ACSR	3	477 AAC	\$439,389.13
Double Circuit	1	4/0 ACSR	3	477 AAC	\$447,727.68
Double Circuit	1	#2 ACSR	3	477 AAC	\$447,727.68
Double Circuit	1	#2 BC	3	477 AAC	\$447,727.68
Double Circuit	1	#4 BC	3	477 AAC	\$447,727.68
Double Circuit	1	477 AAC	3	477 AAC	\$447,727.68
Double Circuit	2	1/0 ACSR	3	477 AAC	\$439,389.13
Double Circuit	2	4/0 ACSR	3	477 AAC	\$447,727.68
Double Circuit	2	#2 ACSR	3	477 AAC	\$447,727.68
Double Circuit	2	#2 BC	3	477 AAC	\$447,727.68
Double Circuit	2	#4 BC	3	477 AAC	\$447,727.68
Double Circuit	2	477 AAC	3	477 AAC	\$447,727.68
Double Circuit	3	1/0 ACSR	3	477 AAC	\$439,389.13
Double Circuit	3	4/0 ACSR	3	477 AAC	\$447,727.68
Double Circuit	3	#2 ACSR	3	477 AAC	\$447,727.68
Double Circuit	3	#2 BC	3	477 AAC	\$447,727.68
Double Circuit	3	#4 BC	3	477 AAC	\$447,727.68
Double Circuit	3	477 AAC	3	477 AAC	\$447,727.68
Triple Circuit	1	1/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	1	4/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	1	#2 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	1	#2 BC	3	477 AAC	\$570,000.00
Triple Circuit	1	#4 BC	3	477 AAC	\$570,000.00
Triple Circuit	1	477 AAC	3	477 AAC	\$570,000.00
Triple Circuit	2	1/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	2	4/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	2	#2 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	2	#2 BC	3	477 AAC	\$570,000.00
Triple Circuit	2	#4 BC	3	477 AAC	\$570,000.00
Triple Circuit	2	477 AAC	3	477 AAC	\$570,000.00
Triple Circuit	3	1/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	3	4/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	3	#2 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	3	#2 BC	3	477 AAC	\$570,000.00
Triple Circuit	3	#4 BC	3	477 AAC	\$570,000.00
Triple Circuit	3	477 AAC	3	477 AAC	\$570,000.00
Verify for High Capacity	3	477 AAC	0	None	\$50,000.00
Double Circuit	0	MCM Undergro	3	3 MCM Undergro	\$500,323.77
Build New Line	0	None	3	3 MCM Undergro	\$500,323.77

Equipment	\$/unit
G&W Electronic Recloser	\$39,091.36







Docket No. E-2, Sub 1220

Williams Solar, LLC

Burke Exhibit JB-12

Williams Solar Estimation Tool.xlsx, System Modifications  
sheet

*Produced by DEP in Response to Williams Solar's  
Interrogatory No. 3*

#	Action	From DIS#	To DIS#	Distance (Miles)	Existing # of phases	Existing Conductor	New # of phases	New Conductor	Estimated Cost	Description
1	Reconductor	2M845	2M843	0.0775	1	#2 ACSR	3	477 AAC	\$20,970.58	Upgrade 0.0775 miles of existing 1-phase #2 ACSR to 3-phase 477 AAC with 1/0 AAAC neutral from DIS# 2M845 to DIS# 2M843.
2	Reconductor	2M843	2M803	1.342	1	#4 BC	3	477 AAC	\$358,173.00	Upgrade 1.342 miles of existing 1-phase #4 BC to 3-phase 477 AAC with 1/0 AAAC neutral from DIS# 2M843 to DIS# 2M803.
3	Reconductor	2M803	2L653	1.114	3	#2 ACSR	3	477 AAC	\$325,046.18	Upgrade 1.114 miles of existing 3-phase #2 ACSR to 3-phase 477 AAC with 1/0 AAAC neutral from DIS# 2M803 to DIS# 2L653.
4	None					None		None	\$0.00	0
5	None					None		None	\$0.00	0
6	None					None		None	\$0.00	0
7	None					None		None	\$0.00	0
8	None					None		None	\$0.00	0
9	None					None		None	\$0.00	0
10	None					None		None	\$0.00	0

**Total Cost Estimate: \$704,189.76**

Library

Code	Actions	Conductor Types
1	None	None
2	Build New Line	1/0 ACSR
3	Reconductor	4/0 ACSR
4	Double Circuit	#2 ACSR
5	Triple Circuit	#2 BC
6	Add G&W at Takeoff	#4 BC
7	Verify for High Capacity	477 AAC
8		750 MCM Underground
9		
10		
11		

Neutral Conductor: 1/0 AAAC

Pricing

Action	Existing # of phases	Existing Conductor	New # of phases	New Conductor	\$/mile
Build New Line	0	None	3	477 AAC	\$256,036.99
Reconductor	1	1/0 ACSR	3	477 AAC	\$247,683.87
Reconductor	1	4/0 ACSR	3	477 AAC	
Reconductor	1	#2 ACSR	3	477 AAC	\$270,588.16
Reconductor	1	#2 BC	3	477 AAC	
Reconductor	1	#4 BC	3	477 AAC	\$266,894.93
Reconductor	1	477 AAC	3	477 AAC	
Reconductor	2	1/0 ACSR	3	477 AAC	\$246,100.45
Reconductor	2	4/0 ACSR	3	477 AAC	
Reconductor	2	#2 ACSR	3	477 AAC	\$268,988.30
Reconductor	2	#2 BC	3	477 AAC	
Reconductor	2	#4 BC	3	477 AAC	\$272,815.38
Reconductor	2	477 AAC	3	477 AAC	
Reconductor	3	1/0 ACSR	3	477 AAC	\$250,342.87
Reconductor	3	4/0 ACSR	3	477 AAC	\$250,432.94
Reconductor	3	#2 ACSR	3	477 AAC	\$291,782.93
Reconductor	3	#2 BC	3	477 AAC	\$291,782.93
Reconductor	3	#4 BC	3	477 AAC	\$291,602.78
Double Circuit	1	1/0 ACSR	3	477 AAC	\$439,389.13
Double Circuit	1	4/0 ACSR	3	477 AAC	\$447,727.68
Double Circuit	1	#2 ACSR	3	477 AAC	\$447,727.68
Double Circuit	1	#2 BC	3	477 AAC	\$447,727.68
Double Circuit	1	#4 BC	3	477 AAC	\$447,727.68
Double Circuit	1	477 AAC	3	477 AAC	\$447,727.68
Double Circuit	2	1/0 ACSR	3	477 AAC	\$439,389.13
Double Circuit	2	4/0 ACSR	3	477 AAC	\$447,727.68
Double Circuit	2	#2 ACSR	3	477 AAC	\$447,727.68
Double Circuit	2	#2 BC	3	477 AAC	\$447,727.68
Double Circuit	2	#4 BC	3	477 AAC	\$447,727.68
Double Circuit	2	477 AAC	3	477 AAC	\$447,727.68
Double Circuit	3	1/0 ACSR	3	477 AAC	\$439,389.13
Double Circuit	3	4/0 ACSR	3	477 AAC	\$447,727.68
Double Circuit	3	#2 ACSR	3	477 AAC	\$447,727.68
Double Circuit	3	#2 BC	3	477 AAC	\$447,727.68
Double Circuit	3	#4 BC	3	477 AAC	\$447,727.68
Double Circuit	3	477 AAC	3	477 AAC	\$447,727.68
Triple Circuit	1	1/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	1	4/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	1	#2 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	1	#2 BC	3	477 AAC	\$570,000.00
Triple Circuit	1	#4 BC	3	477 AAC	\$570,000.00
Triple Circuit	1	477 AAC	3	477 AAC	\$570,000.00
Triple Circuit	2	1/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	2	4/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	2	#2 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	2	#2 BC	3	477 AAC	\$570,000.00
Triple Circuit	2	#4 BC	3	477 AAC	\$570,000.00
Triple Circuit	2	477 AAC	3	477 AAC	\$570,000.00
Triple Circuit	3	1/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	3	4/0 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	3	#2 ACSR	3	477 AAC	\$570,000.00
Triple Circuit	3	#2 BC	3	477 AAC	\$570,000.00
Triple Circuit	3	#4 BC	3	477 AAC	\$570,000.00
Triple Circuit	3	477 AAC	3	477 AAC	\$570,000.00
Verify for High Capacity	3	477 AAC	0	None	\$50,000.00
Double Circuit	0	MCM Undergro	3	3 MCM Undergro	\$500,323.77
Build New Line	0	None	3	3 MCM Undergro	\$500,323.77

Equipment	\$/unit
G&W Electronic Recloser	\$39,091.36





Docket No. E-2, Sub 1220

Williams Solar, LLC

Burke Exhibit JB-13

DR No. 1-3 Revised Estimating Tool Description –  
Williams Solar

*Produced by DEP in Response to Williams Solar's  
Interrogatory No. 3*

## Overview of Revised Estimating Tool – Williams Solar

In order to give developers a “best estimate cost, including overheads,” the Revised Estimating Tool (RET) was designed based on actual cost analysis of projects built and energized across 2018 and 2019.

RET updates the existing Duke Energy cost models in MAXIMO to more accurately reflect total project costs Duke Energy will likely incur from completion of Facility Study through completion of interconnection-related project construction. RET accounts for increased future costs by projecting inflation-impacted labor, material and equipment costs, modeling more likely resourcing and equipment requirements and adding a contingency factor for unforeseen events that have historically increased costs.

### Why were changes needed to existing Duke Energy cost models?

- Interconnected projects are funded by developers and must comply with specific state or FERC regulations, including a requirement for best estimate costs
- Time from Facility Study completion to construction project energization can take several years. Historically, Duke Energy has incurred actual cost increases from the time of Facility Study completions due to multiple reasons, including but not limited to:
  - Inflation on materials, equipment, etc.
  - Contractual changes with internal and external resources
  - Changes to required internal/external resource/equipment usage due to volumes, etc.
  - Unforeseen project facility circumstances such as land constraints
  - Increased regulatory and safety requirements

### Summary of RET changes to existing Duke Energy cost models

- Increased labor hours after including productivity constraints– MAXIMO model consistently underestimated labor hours for interconnection projects. MAXIMO has been recently updated to include some productivity constraints, so the RET model has been adjusted accordingly
- Increased contractor hourly rates – MAXIMO model used rate that consistently underestimated the levels of contractor resources and hourly rates used on interconnection projects
- Increased contractor fleet expenses previously underestimated in estimates
- Included inflation rate at 3% per year for labor and equipment x 2 years
- Included contingency of 20% to account for potential changes to operating and safety procedures, unforeseen construction issues caused by weather or ground conditions, etc.
- Increased overhead rates - MAXIMO model consistently underestimated overheads charged to interconnection projects



## Detailed RET process

### MAXIMO

Duke Energy uses a system called MAXIMO for work order origination and tracking as well as supply chain functions. Labor hour estimates and costs for types of work are pre-programmed in MAXIMO. MAXIMO estimates assume an 8-hour workday, 40 hours per work week for a 4-man crew.

### Productivity Rate

To improve accuracy, estimated labor hours must incorporate contractually required reductions for travel, safety meetings, and set-up and take down during an average work day, among other things. The RET tool assumed a productivity rate of 75% for projects estimated prior to December 2019. MAXIMO was updated for productivity starting 12/1/2019, so the RET model has been adjusted to 90% DEP and 79% DEC for projects estimated from December 2019 to current to more closely match what we anticipate for actual charges.

### Conversion from Estimated Hours to Estimated Weeks of Work

For a MAXIMO estimate of **4,580** labor hours, RET calculates **6,107** labor hours to complete the work.

- **4,580** MAXIMO hours divided by 75% Productivity Rate = **6,107 RET estimated labor hours**

If a project has 800 labor hours estimated, that project is estimated to take 5 weeks, since Duke Energy estimates a work week as 5, 8-hour days for a team of 4, 160 labor hours. This small partial week was not rounded up to the nearest total week for conservatism in the estimate.

- **6,107** estimated labor hours / (5 x 8 x 4) = **38.17 weeks**

### Inflation Rate

The RET tool assumes 3% inflation per year with assumption that interconnection projects span 2 years from completion of Facility Study to completion of interconnection-related construction projects. RET adds 6% Inflation to the following Direct Costs:

- Labor Costs (LC)
- Material Costs (EMC)
- Vehicle Costs (VC)
- Flagging Costs (EFC)
- Additional Costs if applicable

### Contingency

RET adds 20% Contingency for unforeseen risks to the following Direct Costs:

- Labor Costs (LC)
- Material Costs (EMC)
- Vehicle Costs (VC)
- Flagging Costs (EFC)
- Additional Costs if applicable

**Overheads**

RET adds 25% for Overhead Burdens to Direct Costs plus Contingency for LC, VC, EFC.

If there are Additional Costs such as Environmental, Tree Trimming, Right of Way, etc., those Additional Costs also include a 25% Overhead Burden.

For Materials, the Overhead Burden is 48.75%, which includes 33.75% for material allocations and 15% for stores loading.

**Conversion to Estimated Cost per Man Week Using Revised Hours and Inflation Rate**

RET uses a blended hourly contractor rate of \$75 per labor hour. Actual rates will vary dependent on the actual work and assigned crew resources and are charged based on contractual contractor rates negotiated in confidential Master Service Agreements with Duke Energy. Assigned crews can be a mixture of the following resources:

- General Foreman
- Working Foreman
- Class A Lineman
- Class B Lineman
- Class C Lineman
- Groundman
- Equipment Operator
- Truck Driver

Cost per Person per Man Week =  $(\$75 \times 5 \times 8) \times 1.06$  inflation assumption for 2 years = \$3,180.00

**Conversion to Estimated Total Labor Costs (LC) for Project**

(Cost per Man Week) x (Number of Crews x Number of people per crew) x (Estimated Weeks of Work)

- |  |             |
|--|-------------|
| • \$3,180 X 1 crew x 4 people per crew times 38 weeks      | = \$483,360 |
| • \$483,360 X 0.20 Contingency                             | = \$ 96,672 |
| • \$580,032 X 0.25 Overheads                               | = \$145,008 |
| • <b>\$725,040 Total LC (with Inflation and Overheads)</b> |             |

Assumptions are adjusted in RET if the design requires more than the standard resources outlined above.

**Vehicle Costs (VC)**

Duke Energy subcontractors charge a separate hourly rate for vehicles and equipment required to perform the work. RET uses a blended rate of \$30 per hour since the actual rate will vary dependent on the work, assigned equipment, and contractually negotiated terms. Assigned equipment can be a mixture of the example following items:

- 50-60' Material Handler Bucket
- Up to 20,000 lbs. Digger Derrick
- Hourly - Pickup 3/4 Ton (4X4)
- Pickup 1/2 (4X4)
- Material Trailer
- Two Axle Pole Trailer
- Single Axle Pole Trailer
- Material Trailer
- Puller/Tensioner

(Cost per Man Week) x (Number of Crews x Number of people per crew) x (Estimated Weeks of Work)

- Cost per Man Week = (\$30 x 5 x 8) x 1.06 inflation assumption for 2 years = \$ 1,272
- \$ 1,272 X 1 crew x 4 people per crew times 38 weeks = \$193,344
- \$193,344 X 0.20 Contingency = \$ 36,689
- \$232,013 X 0.25 Overheads = \$ 58,003
- **\$290,016 Total VC (with Inflation and Overheads)**

Assumptions are adjusted in RET if the design requires more than the standard resources outlined above.

**Estimated Material Costs (EMC)**

Material costs are estimated in MAXIMO based on unit estimates. RET increases the MAXIMO estimated costs for inflation across 2 years:

- \$143,328 X 1.06 inflation assumption for 2 years = \$151,927
- \$151,927 X 0.4875 Material Overheads = \$ 74,065
- \$151,927 + \$74,065 = \$225,992
- \$225,992 X 0.20 Contingency = \$ 45,198
- \$45,198 X 0.25 Overheads = \$ 11,300
- \$225,992 + \$45,198 + \$11,300 = \$282,490
- **\$282,490 Total EMC (with Inflation and Overheads)**

**Estimated Flagging Costs (EFC) – Flagging was minimal**

Flagging costs are normally estimated assuming 2 flaggers for half of the estimated length of the project. Flaggers hourly blended rate is \$38.38.

Flagging for this project was minimal so it was included as part of Contingency as part of a good faith estimate.

$$\text{EFC Blended Rate:} = \frac{((\text{Rate}/\text{Hr} \times 40 \text{ hr} + \text{OT Rate}/\text{Hr} \times 5 \text{ OT hours}) \times (\text{Contractor Mark-Up}))}{45 \text{ labor Hours / Week}}$$

- \$38.38 X 5 X 8 X 0 weeks = \$0
- \$0 X 0.20 Contingency = \$0
- \$0 X 0.25 Overheads = \$0
- **\$0 Total EFC (with Inflation and Overheads)**

**Additional Costs, such as Environmental, Tree Trimming and Right of Way Costs**

There is a section in RET to remind planners to consider the need to add these costs if they are required for the specific project. If these costs are included, they also include 20% Contingency and 25% Overheads.

If estimated MAXIMO cost = \$20,000, RET would calculate Total as follows:

- \$0 X 0.20 Contingency = \$ 0
- \$0 X 0.25 Overheads = \$ 0
- **\$0 Total (with Inflation and Overheads)**

**Summary Table Costs**

Estimated Labor Costs Total (LC)	\$	725,040.00
Estimated Vehicle / Equipment Total (VC)	\$	290,016.00
Estimated Total Material Costs (EMC)	\$	282,490.03
Estimated Total Flagging Estimate (EFC)	\$	-
Estimated Total Adder Amount	\$	-
<b>T&amp;E Estimate</b>	<b>\$</b>	<b>1,297,546.03</b>

**Revised Estimating Tool Output**

<b>Interconnection Agreement Total</b>	
<b>Description</b>	<b>Worksheet Calculation</b>
Engineering & Design	\$ 21,369.60
Labor & Equipment - Estimated	\$ 1,061,083.33
Materials - Estimated	\$ 331,666.17
Other - Estimated	\$ 4,451.82
<b>Total Interconnection Agreement Estimate</b>	<b>\$ 1,418,570.93</b>

<b>Interconnection Facilities</b>	
<b>Description</b>	<b>Worksheet Calculation</b>
Engineering & Design	\$ 1,068.48
Labor & Equipment - Estimated	\$ 55,028.85
Materials - Estimated	\$ 60,475.74
Other - Estimated	\$ 4,451.82
<b>Total Interconnection Agreement Estimate</b>	<b>\$ 121,024.90</b>

<b>System Upgrades</b>	
<b>Description</b>	<b>Worksheet Calculation</b>
Engineering & Design	\$ 20,301.12
Labor & Equipment - Estimated	\$ 1,006,054.48
Materials - Estimated	\$ 271,190.43
Other - Estimated	\$ -
<b>Total Interconnection Agreement Estimate</b>	<b>\$ 1,297,546.03</b>

System Upgrades			
Description	REM	MAXIMO	VARIANCE
Estimated Productive Manhours	4,580.43		
Estimated Hours to Complete Work	6,107.24	4,580.43	(1,526.81)
Cost per Man Week	3,180.00		
Estimated weeks of work (calculated)	38.00	29.00	(9.00)
Labor Costs	\$483,360.00	\$336,854.27	(146,505.73)
Vehicle costs	\$193,344.00		(193,344.00)
Hotel	\$-		-
Per Diem	\$-		-
<b>Estimated T&amp;E Labor Costs</b>	<b>\$676,704.00</b>	<b>\$336,854.27</b>	<b>\$(339,849.73)</b>
Material Costs	\$151,927.41	\$143,327.75	\$(8,599.66)
Material O/H (Mat Alloc 33.75% + Stores Loading 15%)	\$74,064.61	\$24,365.72	\$(49,698.90)
Flagging Estimate	\$-	\$1,451.52	\$1,451.52
Tree Trim Estimate	\$-	\$-	\$-
Adder Amount for Additional Estimated Costs	\$-		\$-
<b>Total Direct Costs</b>	<b>\$902,696.02</b>	<b>\$505,999.25</b>	<b>\$(396,696.77)</b>
Contingency	\$180,539.20		\$(180,539.20)
<b>Sub-Total before Burdens with Contingency</b>	<b>\$1,083,235.23</b>	<b>\$505,999.25</b>	<b>\$(577,235.98)</b>
Overhead Burdens	\$214,310.80	\$173,420.06	\$(40,890.74)
<b>T&amp;E Estimate</b>	<b>\$1,297,546.03</b>	<b>\$679,419.31</b>	<b>\$(618,126.72)</b>

Interconnection Facilities			
Description	REM	MAXIMO	VARIANCE
Estimated Productive Manhours	213.69		
Estimated Hours to Complete Work	284.92	213.69	(71.23)
Cost per Man Week	3,180.00		
Estimated weeks of work (calculated)	2.00		(2.00)
Labor Costs	\$25,440.00	\$15,712.13	(9,727.87)
Vehicle costs	\$10,176.00		(10,176.00)
Hotel	\$-		-
Per Diem	\$-		-
<b>Estimated T&amp;E Labor Costs</b>	<b>\$35,616.00</b>	<b>\$15,712.13</b>	<b>\$(19,903.87)</b>
Material Costs	\$33,879.97	\$31,962.23	\$(1,917.73)
Material O/H (Mat Alloc 33.75% + Stores Loading 15%)	\$16,516.48	\$5,433.58	\$(11,082.90)
Flagging Estimate	\$3,070.22	\$-	\$(3,070.22)
Tree Trim Estimate	\$-	\$-	\$-
Adder Amount for Additional Estimated Costs	\$-		\$-
<b>Total Direct Costs</b>	<b>\$89,082.68</b>	<b>\$53,107.94</b>	<b>\$(35,974.73)</b>
Contingency	\$17,816.54		\$(17,816.54)
<b>Sub-Total before Burdens with Contingency</b>	<b>\$106,899.21</b>	<b>\$53,107.94</b>	<b>\$(53,791.27)</b>
Overhead Burdens	\$14,125.69	\$8,138.88	\$(5,986.81)
<b>T&amp;E Estimate</b>	<b>\$121,024.90</b>	<b>\$61,246.82</b>	<b>\$(59,778.08)</b>





# Duke Energy – Interconnection Cost Update & Tracker

## Key Updates and Highlights for Project Mitchell

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November 7<sup>th</sup>, 2019

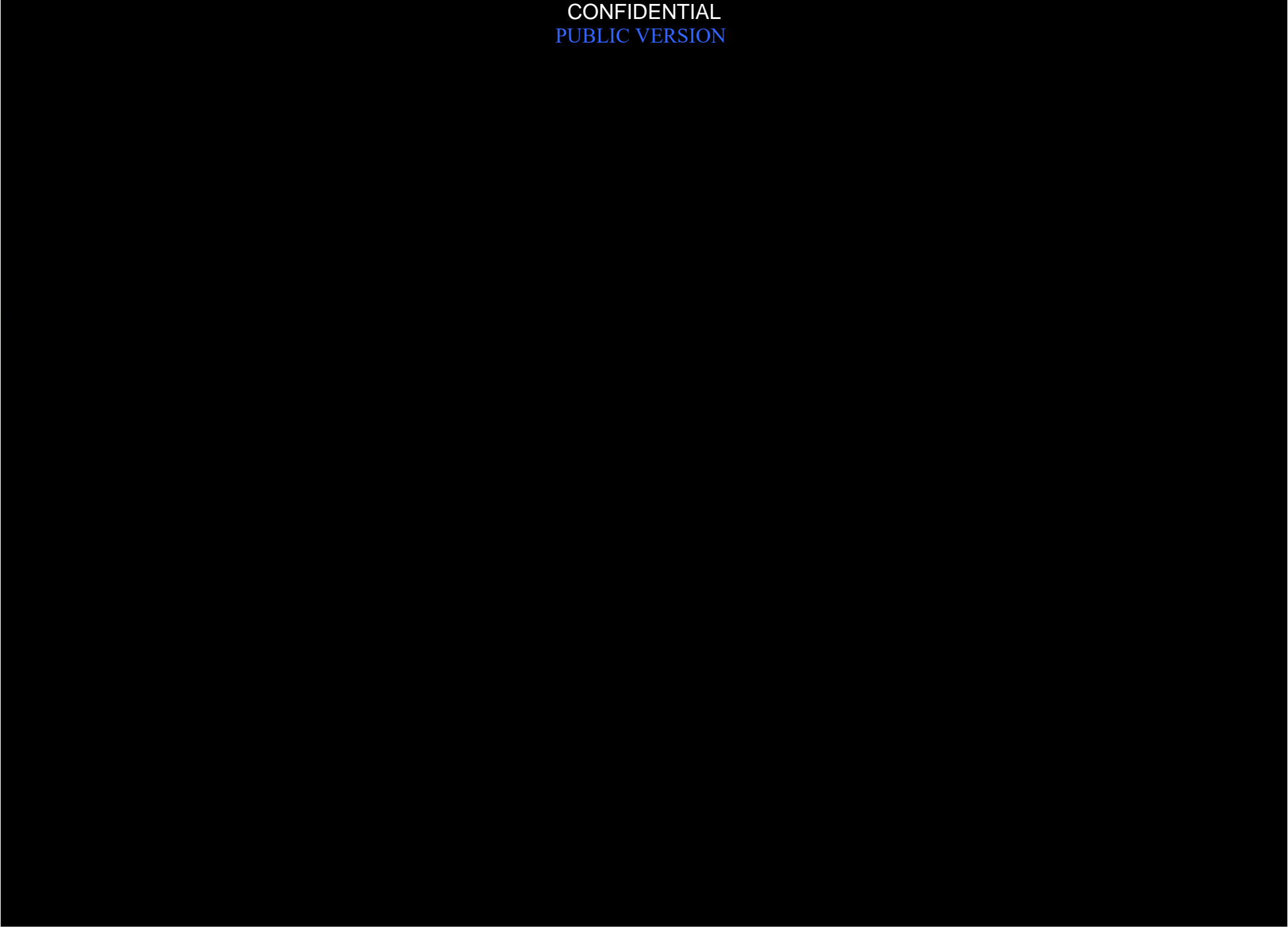
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