

INFORMATION SHEET

PRESIDING: Commissioner Duffley; Chair Mitchell and Commissioners Brown-Bland, Gray, Clodfelter, Hughes and McKissick
PLACE: Via WebEx Videoconference
DATE: Wednesday, June 17, 2020
TIME: 11:00 a.m. – 12:36 p.m.
DOCKET NO.: E-2, Sub 1220
COMPANY: Williams Solar
DESCRIPTION: Williams Solar, LLC, Complainant, versus Duke Energy Progress, LLC, Respondent
VOLUME: 1

APPEARANCES

FOR WILLIAMS SOLAR, LLC:
 Marcus Trathen, Esq.
 Eric David, Esq.
 Matthew Tynan, Esq.

FOR DUKE ENERGY PROGRESS, LLC:
 Jack E. Jirak, Esq.
 Brett Breitschwerdt, Esq.

WITNESSES

Jonathan Burke

EXHIBITS

Exhibits JB-1 through 14 (Confidential 5 and 14 filed under seal) I/A

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NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP

DATE: 6/17/20 DOCKET NO.: E-2, Sub 1220

ATTORNEY NAME and TITLE: Marcus Trathen

FIRM NAME: Brooks, Pierce, McLendon, Humphrey & Leonard, LLP

ADDRESS: 1700 Wells Fargo Capitol Center, 150 Fayetteville St.

CITY: Raleigh STATE: NC ZIP CODE: 27601

APPEARING FOR: Williams Solar, LLC

APPLICANT: ___ COMPLAINANT: X INTERVENOR: ___

PROTESTANT: ___ RESPONDENT: ___ DEFENDANT: ___

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Email: mtrathen@brookspierce.com

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**NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP**

DATE: 6/17/20 DOCKET NO.: E-2, Sub 1220

ATTORNEY NAME and TITLE: Eric David

FIRM NAME: Brooks, Pierce, McLendon, Humphrey & Leonard, LLP

ADDRESS: 1700 Wells Fargo Capitol Center, 150 Fayetteville St.

CITY: Raleigh STATE: NC ZIP CODE: 27601

APPEARING FOR: Williams Solar, LLC

APPLICANT: ___ COMPLAINANT: X INTERVENOR: ___

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NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP

DATE: 6/17/20 DOCKET NO.: E-2, Sub 1220

ATTORNEY NAME and TITLE: Matthew Tynan

FIRM NAME: Brooks, Pierce, McLendon, Humphrey & Leonard, LLP

ADDRESS: Suite 2000 Renaissance Plaza

CITY: Greensboro STATE: NC ZIP CODE: 27401

APPEARING FOR: Williams Solar, LLC

APPLICANT: ___ COMPLAINANT: X INTERVENOR: ___

PROTESTANT: ___ RESPONDENT: ___ DEFENDANT: ___

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**NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP**

DATE: June 17, 2020 DOCKET NO.: E-2 Sub 1220
ATTORNEY NAME and TITLE: Jack Jirak, Assoc. Gen. Counsel
FIRM NAME: Duke Energy Progress
ADDRESS: 410 S. Wilmington St NC 20
CITY: Raleigh STATE: NC ZIP CODE: 27602
APPEARING FOR: Duke Energy Progress

APPLICANT: ___ COMPLAINANT: ___ INTERVENOR: ___
PROTESTANT: ___ RESPONDENT: ___ DEFENDANT:

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Email: Jack.Jirak@duke-energy.com

SIGNATURE: Jack Jirak

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**NORTH CAROLINA UTILITIES COMMISSION
APPEARANCE SLIP**

DATE: 6-17-20 DOCKET NO.: E. 2 Sub 1220
ATTORNEY NAME and TITLE: E. Brett Breitschwerdt
FIRM NAME: McGuire Woods LLP
ADDRESS: 501 Fayetteville St. Suite 500
CITY: Raleigh STATE: NC ZIP CODE: 27601
APPEARING FOR: Duke Energy Progress, LLC

APPLICANT: ___ COMPLAINANT: ___ INTERVENOR: ___
PROTESTANT: ___ RESPONDENT: ___ DEFENDANT: X

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INDEX OF EXHIBITS

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

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

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

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

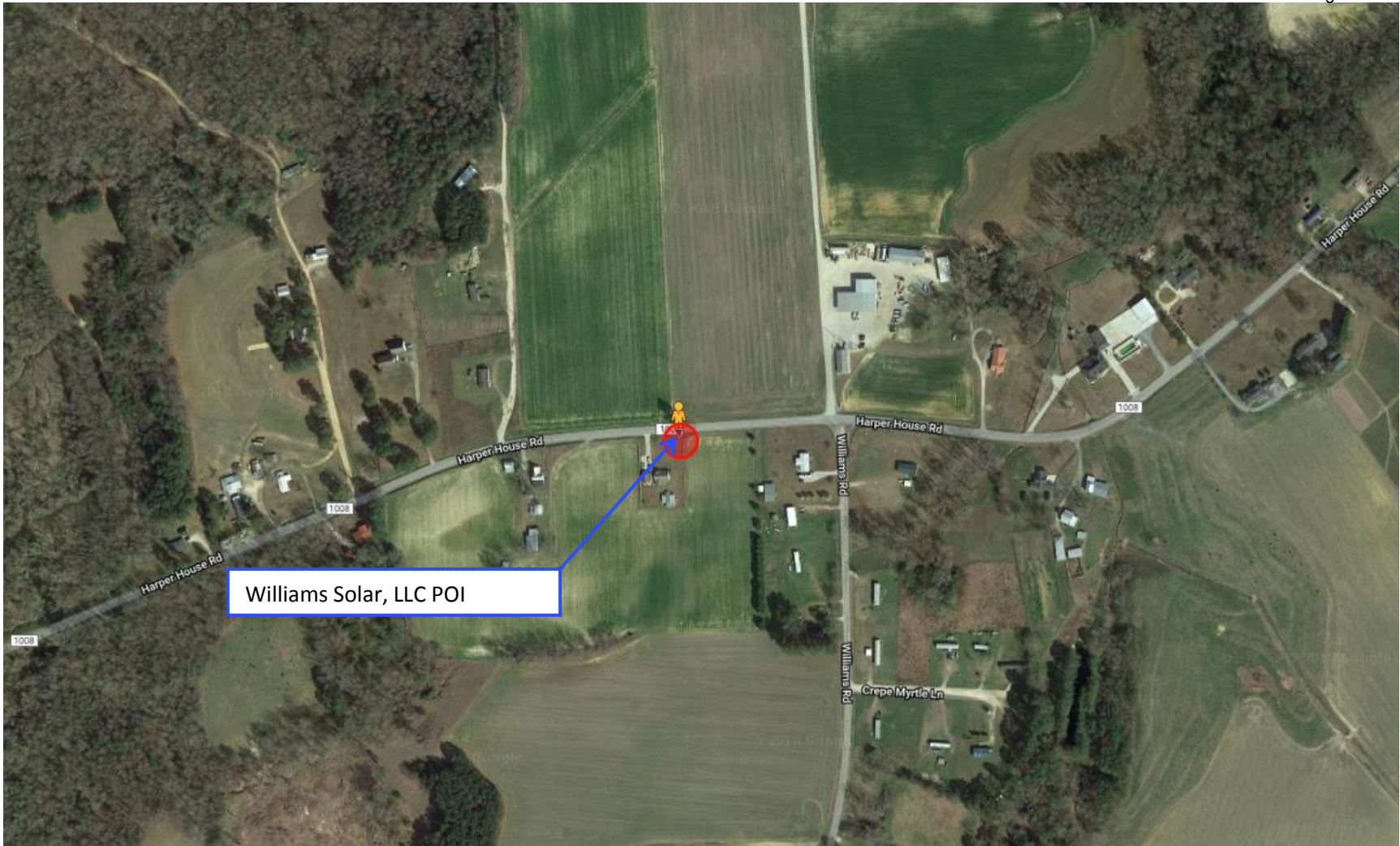


Figure 1 - Point Of Interconnection

Distributed Energy Resource Planning & Interconnection Guidelines

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

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

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

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 _A	V _B	V _C	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 _A	V _B	V _C	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

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

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

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
Total Upfront Charges	\$774,000

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% ΔV 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% ΔV 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% ΔV 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% ΔV 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: Jeffrey W. Riggins
Print Name: Jeffrey W. Riggins
Title: Director, DET Interconnects and Standard PPAs
Date February 25, 2019

For the Interconnection Customer

Name: Frederik Flagstad
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

Page 1 of 6

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> 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> 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]
Sent: Tuesday, July 30, 2019 2:52 PM
To: Winter, Lee P <Lee.Winter@duke-energy.com>; DERContracts <DERContracts@duke-energy.com>
Cc: Flagstad, Frederik -greengoenergy <frederik@greengoenergy.com>; Interconnection US <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.

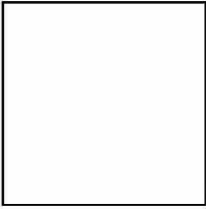
Thank you for your help in clarifying this FS Result.

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 | 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> 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.

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

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- 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)

September 9, 2019

Via Email

DERContracts@duke-energy.com

Bo.Somers@duke-energy.com

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.

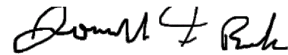
Notice of Dispute
September 9, 2019
Page 2

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)	
)	RESPONDENT DUKE ENERGY
)	PROGRESS, LLC'S RESPONSES
)	TO COMPLAINANT'S FIRST SET
v.)	OF INTERROGATORIES AND
)	REQUESTS FOR PRODUCTION
Duke Energy Progress, LLC,)	OF DOCUMENTS
)	
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.

Docket No. E-2, Sub 1220
Williams Solar Data Request No. 1
Item No. 1-1
Page 1 of 1

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

Docket No. E-2, Sub 1220
Williams Solar Data Request No. 1
Item No. 1-2
Page 1 of 1

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
Total:	\$1,388,374.25

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%

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

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
Total Labor Costs (LC)		= \$725,040

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
Total VC (with Inflation and Overheads)	= \$290,016

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
Total EMC (with Inflation and Overheads)	= \$282,490

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

Docket No. E-2, Sub 1220
Williams Solar Data Request No. 1
Item No. 1-3
Page 1 of 1

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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Williams Solar Data Request No. 1
Item No. 1-4
Page 1 of 1

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

Docket No. E-2, Sub 1220
Williams Solar Data Request No. 1
Item No. 1-5
Page 1 of 1

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

Docket No. E-2, Sub 1220
Williams Solar Data Request No. 1
Item No. 1-6
Page 1 of 1

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

Docket No. E-2, Sub 1220
Williams Solar Data Request No. 1
Item No. 1-7
Page 1 of 1

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

Docket No. E-2, Sub 1220
Williams Solar Data Request No. 1
Item No. 1-8
Page 1 of 1

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

Docket No. E-2, Sub 1220
Williams Solar Data Request No. 1
Item No. 1-9
Page 1 of 1

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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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:

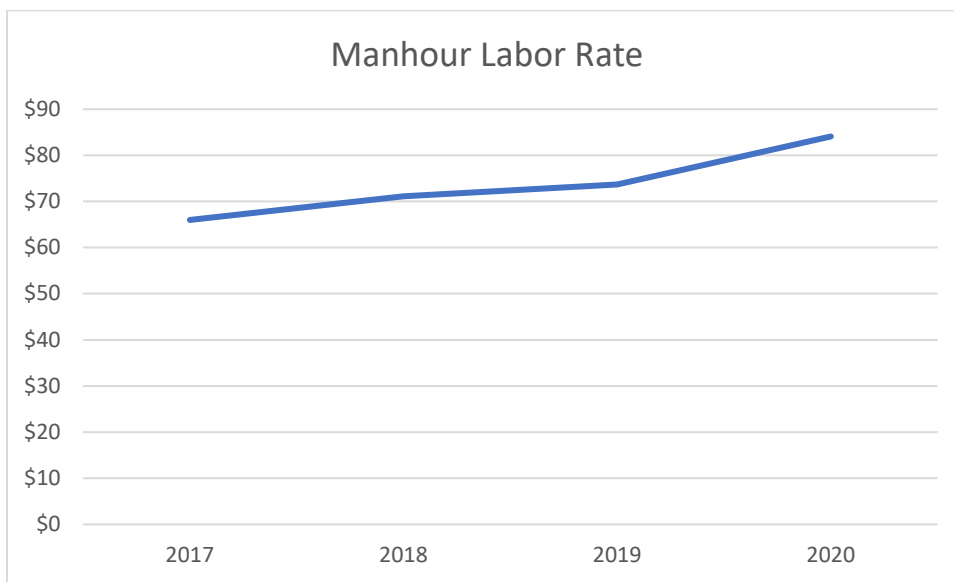
21. For the period from January 1, 2015 to the present, provide a trend comparison of labor cost assumptions for each type of cost listed in the Williams Solar system upgrades and interconnection facilities estimates.

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:

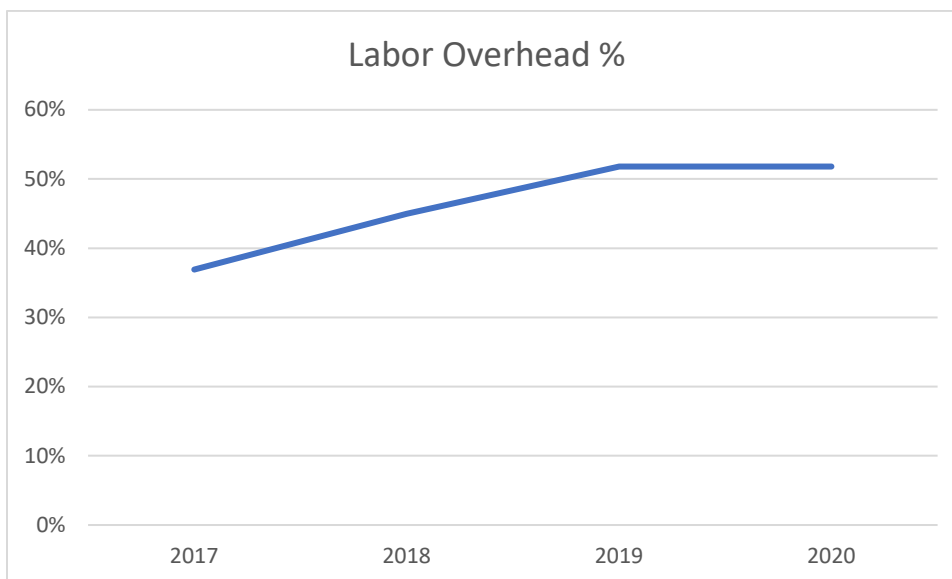
22. For the period from January 1, 2015 to the present, provide a trend comparison of overhead allocation cost assumptions per quarter.

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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Item No. 1-2
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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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Item No. 1-9
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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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Item No. 1-10
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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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Page 1 of 1

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
bbreitschwerdt@mcguirewoods.com

Jack E. Jirak, Associate General Counsel
Duke Energy Corporation
PO Box 1551 / NCRH20
Raleigh, North Carolina 27602
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 21st day of February, 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
bbreitschwerdt@mcguirewoods.com

Attorney for Duke Energy Progress, LLC

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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

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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Item No. 1-3
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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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.

Name (Last, First)
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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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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Item No. 1-6
Page 2 of 2**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, 3rd 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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Williams Solar RFP No. 1
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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Page 2 of 2

“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

Docket No. E-2, Sub 1220
Williams Solar RFP No. 1
Item No. 1-4
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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Williams Solar RFP No. 1
Item No. 1-4
Page 2 of 2

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
Williams Solar RFP No. 1
Item No. 1-10
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
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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
McGuireWoods LLP
501 Fayetteville Street, Suite 500
PO Box 27507 (27611)
Raleigh, North Carolina 27601
Telephone: (919) 755-6563
bbreitschwerdt@mcguirewoods.com

Jack E. Jirak, Associate General Counsel
Duke Energy Corporation
PO Box 1551 / NCRH20
Raleigh, North Carolina 27602
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'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 20th Day of March, 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
bbreitschwerdt@mcguirewoods.com

Attorney for Duke Energy Progress, LLC

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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
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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
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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 |
| • \$725,040 Total LC (with Inflation and Overheads) | |

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	\$	-
T&E Estimate	\$	1,297,546.03

Revised Estimating Tool Output

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

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

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

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	\$-		-
Estimated T&E Labor Costs	\$676,704.00	\$336,854.27	\$(339,849.73)
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	\$-		\$-
Total Direct Costs	\$902,696.02	\$505,999.25	\$(396,696.77)
Contingency	\$180,539.20		\$(180,539.20)
Sub-Total before Burdens with Contingency	\$1,083,235.23	\$505,999.25	\$(577,235.98)
Overhead Burdens	\$214,310.80	\$173,420.06	\$(40,890.74)
T&E Estimate	\$1,297,546.03	\$679,419.31	\$(618,126.72)

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	\$-		-
Estimated T&E Labor Costs	\$35,616.00	\$15,712.13	\$(19,903.87)
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	\$-		\$-
Total Direct Costs	\$89,082.68	\$53,107.94	\$(35,974.73)
Contingency	\$17,816.54		\$(17,816.54)
Sub-Total before Burdens with Contingency	\$106,899.21	\$53,107.94	\$(53,791.27)
Overhead Burdens	\$14,125.69	\$8,138.88	\$(5,986.81)
T&E Estimate	\$121,024.90	\$61,246.82	\$(59,778.08)

Duke Energy – Interconnection Cost Update & Tracker

Key Updates and Highlights for Project Mitchell

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November 7th, 2019

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Denmark

GreenGo Energy Group
Headquarters
Gammel Holtevej 139
2970 Hørsholm, Denmark

Tel +45 77 34 85 32

United States

GreenGo Energy US
US Head Office
1447 S. Tryon St., Suite 201
Charlotte, NC 28203

Tel +1 434 996 0411

Mexico

GoGreen Energy
Lomas de Angelópolis
Local 207
Puebla, 72830 Mexico

Tel +52 222 709 9093

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