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WILLIAMS MULLEN

Robert F. Riley
Direct Dial: 202.293.8121
rriley@williamsmullen.com

February 22, 2021

VIA ELECTRONIC FILING

Mr. Bernard J. Logan, Clerk
c/o Document Control Center
State Corporation Commission
Tyler Building, First Floor
1300 East Main Street
Richmond, Virginia 23219

RE: Application of Pigeon Run Solar, LLC, For a permit to construct and operate an energy storage facility, Case No. PUR-2021-00035

Dear Mr. Logan:

Please find enclosed for filing with the State Corporation Commission ("Commission") the *Application of Pigeon Run Solar, LLC, For a permit to construct and operate an energy storage facility*.

Under separate cover, by hand, the following documents will be filed.

1. An original and fifteen (15) hardcopies of the EXTRAORDINARILY SENSITIVE Supplement, appropriately marked and submitted under seal. The EXTRAORDINARILY SENSITIVE Supplement is being provided to the Office of General Counsel and the Staff of the Commission pursuant to 5 VAC 5-20-170 of the Commission's Rules of Practice and Procedure. Thank you for filing this document in the appropriate manner.
2. An original and fifteen (15) hardcopies of a Motion for Protective Order and proposed Hearing Examiner's Protective Ruling.

Please do not hesitate to call if you have any questions regarding the enclosed.

Very truly yours,

/s/ Robert F. Riley

Robert F. Riley
Counsel for Pigeon Run Solar, LLC

Enclosures

cc: William H. Chambliss, Esq.
C. Meade Browder, Jr., Esq.

210230024

APPLICATION OF
PIGEON RUN SOLAR, LLC

**For a permit to construct and operate
an energy storage facility**

Case No. PUR-2021-00035

Pauline Ung, Esq.
Vice President, Legal
and Asset Management
174 Power Global
200 Spectrum Center Drive
Suite 1020
Irvine, CA 92618
(917) 297-8671
pauline.ung@174powerglobal.com

Robert F. Riley
Bradley J. Nowak
Williams Mullen
1666 K Street, NW
Suite 1200
Washington DC 20006
(202) 833-9200
rriley@williamsmullen.com
bnowak@williamsmullen.com
Counsel for Pigeon Run Solar, LLC

Garland S. Carr
Williams Mullen
Williams Mullen Center
200 South 10th Street, Suite 1600
Richmond, Virginia 23219
(804) 420-6396
gcarr@williamsmullen.com
Counsel for Pigeon Run Solar, LLC

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Campbell County, Virginia, dated November 23, 2020

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**COMMONWEALTH OF VIRGINIA
BEFORE THE
STATE CORPORATION COMMISSION**

APPLICATION OF)	
)	
PIGEON RUN SOLAR, LLC)	CASE NO. PUR-2021-00035
)	
For a permit to construct and operate an energy storage facility)	
)	

APPLICATION

Pigeon Run Solar, LLC ("Pigeon Run Solar"), by counsel, hereby submits this application to the State Corporation Commission ("Commission") pursuant to Rule 80 A of the Commission's Rules of Practice and Procedure, 5 VAC 5-20-80 A, and 20 VAC 5-335-80 C, *Permitting of non-utility energy storage facilities*, for a permit ("Permit") to construct, own, and operate an approximately 20 megawatt ("MW") battery energy storage system ("BESS") to be located in Campbell County, Virginia ("Application").¹ Pigeon Run Solar was formed for the purpose of developing, constructing, owning, and operating an approximately 60 MW alternating current ("AC") photovoltaic solar electric generating project ("Solar Facility") and the associated BESS that is the subject of this Application (collectively, the "Project"). As the BESS will be an integral component of the Solar Facility, this Application at times provides information about the renewable energy Project as a whole. In this Application, however, Pigeon Run Solar is requesting a Permit from the Commission for the BESS only.

Pigeon Run Solar requests that the Commission approve the BESS, grant a Permit and grant such other authority, approval, waivers, or relief as may be appropriate under the law and

¹ For purposes of this Application, the BESS is an energy storage facility, an energy storage system, and an energy storage resource as such terms are defined in 20 VAC 5-335-20, and includes all equipment, other than a transmission or distribution line, needed to interconnect the energy storage resource to the utility's electric system. Such additional equipment includes all switchgear, transformers, inverters, switches, cables, wires, conductors, bus work, protection devices and systems, communication and control devices and systems, fire protection systems, environmental protection systems, and other related equipment.

the Commission's rules and regulations for Pigeon Run Solar to construct, own, and operate the BESS. In support of its Application, Pigeon Run Solar respectfully states the following:

I. The Applicant Has the Technical and Financial Fitness to Construct, Operate, and Maintain the BESS

A. Ownership of Pigeon Run Solar

Pigeon Run Solar, a Delaware limited liability company, is a wholly owned indirect subsidiary of Hanwha Energy USA Holding Corporation d/b/a 174 Power Global LLC ("174 Power Global") which is a wholly owned indirect subsidiary within the Hanwha Group ("Hanwha Group"). 174 Power Global and the Hanwha Energy Corporation ("Hanwha Energy") will provide the financial backing and technical expertise for the Pigeon Run Solar Project. Hanwha Energy is the parent company of 174 Power Global. The Hanwha Group is a Fortune Global 500 company deeply invested in the solar business and uniquely motivated to fully execute on project opportunities. An overview of Pigeon Run Solar's ownership is attached as Appendix 1, Attachment 4 a. None of Pigeon Run Solar's direct or indirect owners is an affiliate of an incumbent electric utility as that term is defined in § 56-576 of the Code of Virginia ("Code").

B. Experience in Developing Renewable Energy Projects

174 Power Global and its affiliates have extensive experience in the development, construction, and operation of photovoltaic solar energy generating facilities and battery energy storage systems throughout the United States. A table showing the other projects developed and managed by the affiliates of Pigeon Run Solar is attached as Appendix 1, Attachment 5 a.

C. Financial Resources of Pigeon Run Solar

174 Power Global and Hanwha Energy will provide the financial backing and technical expertise for the Pigeon Run Solar Project. See the **EXTRAORDINARILY SENSITIVE** Supplement for (i) Application Insert Section I. C; (ii) Attachment 4 a (an ownership overview); and (iii) Attachment 4 b (a list of projects that have been financed by 174 Power Global).

D. FERC's Regulation of Pigeon Run Solar

Pigeon Run Solar intends to file a notice with the Federal Energy Regulatory Commission ("FERC") to certify that it is an exempt wholesale generator ("EWG") as that term is defined in the Public Utility Holding Company Act of 2005² and Section 366.7 of the FERC regulations.³ Pigeon Run Solar anticipates that FERC will authorize it to sell energy, capacity, and ancillary services at market-based rates. Because Pigeon Run Solar will sell electricity for resale, it will be subject to FERC's jurisdiction. Therefore, Pigeon Run Solar's rates and services will be regulated by FERC and not by the Commission.

As noted above, none of Pigeon Run Solar's direct or indirect owners is affiliated with an incumbent electric utility as defined in § 56-576 of the Code. The Project will not serve any Virginia electric retail customers, and the costs of the Project will not be included in the base rates of any utility regulated by the Commission. Therefore, Pigeon Run Solar will not be subject to any provisions of the Code that regulate the rates and service of public utilities that supply retail electric service.

E. Permit by Rule for the Solar Facility

This Application seeks a Permit from the Commission for the BESS only. Pigeon Run Solar will file a permit by rule ("PBR") application for the Solar Facility portion of the Project

² 42 U.S.C. §§ 16451-16463.

³ 18 C.F.R. § 366.7.

with the Virginia Department of Environmental Quality ("DEQ") pursuant to Code § 10.1-1197.5 *et seq.*

II. Description of the Project and the Proposed BESS

A. Description of the Project. Pigeon Run Solar intends to construct, own, and operate the (i) Solar Facility within an approximately 612-acre parcel; and, specifically, (ii) the BESS on approximately 1.1 acres, within the Solar Facility project site. The BESS will allow the Solar Facility to provide energy to the grid during periods when the photovoltaic solar panels cannot produce electricity, thereby contributing to the efficiency of the Project and allowing for more consistent energy inputs into the electrical grid.

B. Description of the Proposed BESS. The BESS is an energy storage facility, an energy storage system, and an energy storage resource as defined in 20 VAC 5-335-20 and includes all equipment, other than a transmission or distribution line, needed to interconnect the energy storage resource to the utility's electric system. Such additional equipment includes, as applicable, all switchgear, transformers, inverters, switches, cables, wires, conductors, bus work, protection devices and systems, communication and control devices and systems, fire protection systems, environmental protection systems, and other related equipment and facilities.⁴

Pigeon Run Solar anticipates that the proposed nickel manganese cobalt ("NMC")-based Lithium-Ion solution batteries will be AC coupled and used primarily for energy shifting to create a dispatchable solar energy power plant. The design, however, will allow utilization of the batteries in any fashion that best supports the objective to supply reliable power to customers. The proposed BESS will have a two- to four-hour duration and will be AC-coupled to the Solar Facility. The battery generally comprises four components: (i) cell, (ii) module, (iii) rack, and (iv) container. One battery rack consists of battery modules and each module is made of multiple

⁴ 20 VAC 5-335-20.

individual battery cells. Each rack will have a BPU (Battery Protection Unit) to protect the system. Multiple racks are combined into a container to increase the overall power of the system and fed into a power conversion unit. This complete system is controlled by an Energy Management System ("EMS") that coordinates and aggregates the functions of each subsystem. A more detailed description of the BESS is set forth in Appendix 1.

C. Construction Standards and Environmental Permits. The BESS will be constructed pursuant to all applicable codes and standards as detailed in Appendix 1 in the response to question 7 e. Pigeon Run Solar is presently consulting with numerous regulatory agencies and will obtain all necessary environmental permits for the BESS in coordination with the DEQ and other agencies such that the BESS will reasonably minimize adverse impacts on the environment. Pigeon Run Solar retained Stantec Consulting Services, Inc. ("Stantec") to conduct an assessment of the BESS site to facilitate the DEQ's and other relevant agencies' review and analysis of the proposed installation and operation of the BESS. The DEQ Supplement is attached as Appendix 2. Based on Stantec's assessment, the BESS, among other things, (i) will not emit any harmful air pollutants or greenhouse gases ("GHGs"), (ii) does not require any air permits, (iii) will not emit pollutants during operations, (iv) does not need emissions offsets or allowances, and (v) does not require a water source for installation or operation. In addition, no wetlands or waters of the United States are located within the BESS site. The status of applications and other communications with these agencies, as of the filing of the Application, is indicated in the DEQ Supplement.

D. Project Site. The BESS will be located on approximately 1.1 acres within the Project site in Campbell County, Virginia. The site is currently used to support agricultural row crops. A topographical map depiction of the proposed BESS site is attached as Appendix 1.

Attachment 6 b. Pigeon Run Solar holds an option to purchase the site from a private entity.

Pigeon Run Solar will exercise the option and purchase the land prior to the commencement of construction activities. As such, Pigeon Run Solar maintains operating control over all real estate required for the BESS.

E. Scenic Assets and Historic Assets. Stantec has conducted a Phase IA Cultural Resources Survey for the proposed BESS site. Based on Stantec's assessment, all shovel tests conducted within the BESS footprint and the immediate surrounding areas were negative for cultural resources and therefore no archaeological resources were identified within the BESS site area. An overview of the archaeological and architectural resources in the vicinity of the BESS is set forth in the DEQ Supplement. See Appendix 2.

F. Campbell County Approval and Support. On August 4, 2020, the Campbell County Board of Supervisors approved a special use permit for Pigeon Run Solar's Solar Facility and BESS. Moreover, the Campbell County Administrator has signed a letter urging the Commission to provide any approvals that may be required. See Exhibit A to this Application.

III. The Proposed BESS Meets the Applicable Regulatory Standards to Obtain a Permit

Pigeon Run Solar seeks an order granting Pigeon Run Solar a Permit to construct, own, and operate the BESS pursuant to 20 VAC 5-335-80⁵ and for such other authority, approval, waivers, or relief as may be appropriate under the law and the Commission's rules and regulations.

⁵ See *Ex Parte: In the matter of establishing rules and regulations pursuant to § 56-585.5 E 5 of the Code of Virginia related to the deployment of energy storage*, Case No. PUR-2020-00120, Doc. Con. Cen. No. 201230015, Order Adopting Regulations, (Dec. 18, 2020).

A. Regulatory Standards for Approval of Permit

Pursuant to 20 VAC 5-335-80 B, in order to approve an energy storage facility, the Commission must find it (i) will have no material adverse effect upon the reliability of electric service provided by any regulated public utility; (ii) does not adversely impact any goal established by the Virginia Environmental Justice Act (Code § 2.2-234 *et seq.*); and (iii) is not otherwise contrary to the public interest.

B. The Proposed BESS Meets the Applicable Regulatory Standards

The BESS satisfies each criteria the Commission designated in 20 VAC 5-335-80 B. Pigeon Run Solar's Application supports a finding that the BESS: (i) will have no material adverse effect upon the reliability of electric service provided by any regulated public utility; (ii) does not adversely impact any goal established by the Virginia Environmental Justice Act; and (iii) is not otherwise contrary to the public interest.

1. The BESS Will Have No Material Adverse Effect Upon the Reliability of Electric Service Provided by Any Regulated Public Utility.

The BESS will not have a material adverse effect upon the reliability of electric service provided by any regulated public utility in Virginia. Rather, the BESS should assure greater reliability of electric service in the local region.⁶ Pigeon Run Solar's integration of the BESS into the Solar Facility will allow the Project to smooth the flow of generation output into the grid resulting in increased energy reliability. Further, it will increase the power delivered through the same electrical interconnection infrastructure, thus reducing the need for additional transmission or distribution lines to serve the area.

⁶ See, e.g., *Application of Chickahominy Power, LLC, For certification of an electric generating facility in Charles City County pursuant to § 56-580 D of the Code of Virginia*, Case No. PUR-2017-00033, 2018 S.C.C. Ann. Rept. 209, Final Order at 9 (May 8, 2018); *Application of C4GT, LLC, For certification of an electric generating facility in Charles City County pursuant to § 56-580 D of the Code of Virginia*, Case No. PUE-2016-00104, 2017 S.C.C. Ann. Rept. 378, Final Order at 9 (May 3, 2017); *Application of Doswell Limited Partnership, For approval and certification of a 340 MW electric generating facility in Hanover County y pursuant to §§ 56-46.1 and 56-580 D of the Code of Virginia*, Case No. PUE-2015-00127, 2016 S.C.C. Ann. Rept. 319, Final Order at 11 (June 1, 2016).

Pigeon Run Solar is progressing through the PJM Interconnection, L.L.C. ("PJM") interconnection process.⁷ The BESS will interconnect to the Virginia Electric and Power Company ("Dominion") system based on the results of the PJM studies. In July 2020, PJM completed the Generation Interconnection Feasibility Study Report ("Feasibility Report") for the BESS, which is attached as Appendix I, Attachment 14 a. The BESS interconnection will be through the 34.5/69 kilovolt dedicated Project main power transformer being developed for the Solar Facility portion of the Project under the PJM queue AE2-185. As a condition of its interconnection with PJM and Dominion, Pigeon Run Solar will be obligated to complete and/or pay for its allocated portion of required upgrades to the system in accordance with the finalized Interconnection Services Agreement ("ISA").⁸ The Feasibility Report indicates, however, that no additional interconnection facilities are required for the BESS. As such, Pigeon Run Solar would not be responsible for any physical interconnection costs or total system network upgrade costs relating to the BESS. See section 5, page 4 of the Feasibility Report.

As previously noted, Pigeon Run Solar anticipates that FERC will authorize it to sell energy, capacity, and ancillary services at market-based rates. The BESS will not make direct retail sales of electricity or provide retail electric service to end users in the Commonwealth. The BESS will contribute to the diversity of competitive storage resources available in the Commonwealth.

⁷ Pigeon Run Solar has two pending PJM queue positions for the Project: AF2-404 (relating to the BESS) and AE2-185 (relating to the Solar Facility).

⁸ Section 217.3 of PJM's Open Access Transmission Tariff ("PJM OATT") requires that "[e]ach New Service Customer shall be obligated to pay for 100 percent of the costs of the minimum amount of Local Upgrades and Network Upgrades necessary to accommodate its New Service Request ..." Section 217.3 of the PJM OATT. Pigeon Run Solar is required to comply with this provision of the PJM tariff as required by the anticipated ISA. See, Section 7.0 of the Interconnection Services Agreements, Attachment O to the PJM OATT. See *Application of Pleinmont Solar, LLC, et al., For certificates of public convenience and necessity for a 500 MW solar generating facility in Spotsylvania County pursuant to §§ 56-46.1 and 56-580 D of the Code of Virginia*, Case No. PUR-2017-00162, S.C.C. Ann. Rept. 310, Order Granting Certificates at 15 (Aug. 8, 2018) ("Pleinmont Solar Order").

2. The BESS Does Not Adversely Impact Any Goal Established by the Virginia Environmental Justice Act (Code § 2.2-234 *et seq.*)

The BESS does not adversely impact any goal established by the Virginia Environmental Justice Act ("Act"). Pursuant to the Act, it is the policy of the Commonwealth to promote environmental justice and ensure that it is carried out throughout the Commonwealth, with a focus on environmental justice communities and fenceline communities.⁹ The Act defines environmental justice communities as "any low-income community or community of color." The Act defines "low-income community" as any census block group in which 30 percent or more of the population is composed of people with low income." Further, the Act defines "low income" as "having an annual household income equal to or less than the greater of (i) an amount equal to 80 percent of the median income of the area in which the household is located, as reported by the Department of Housing and Urban Development, and (ii) 200 percent of the Federal Poverty Level."

Pigeon Run Solar retained Stantec to review the BESS vis-à-vis the Act. The Census block in which the BESS is located would not be considered a low-income community because less than 30% of the population is composed of people with low income, according to the 2014-2018 ACS data. However, the adjacent Census blocks would qualify and therefore, low-income communities are considered present.

The Act defines a "community of color" as a "geographically distinct area where the population of color, expressed as a percentage of the total population of such area, is higher than the population of color in the Commonwealth expressed as a percentage of the total population of the Commonwealth. However, if a community of color is composed primarily of one of the groups listed in the definition of "population of color," the percentage population of such group

⁹ See Code § 2.2-235.

in the Commonwealth shall be used instead of the percentage population of color in the Commonwealth."

Using the definitions provided in the Act, the Census block in which the BESS will be located would not be considered a community of color because according to the 2014-2018 ACS data, the percentage population group primarily composing the population of color is less than the percentage of that population within the Commonwealth. However, adjacent Census blocks would qualify and therefore, communities of color are considered present.

The Act defines a fenceline community as "an area that contains all or part of a low-income community or community of color and that presents an increased health risk to its residents due to its proximity to a major source of pollution." The BESS is not a major source of pollution and no major sources of pollution are present within one mile of the BESS. As such, fenceline communities are not considered to be present within the vicinity of the BESS.

While the Census block in which the BESS will be located does not indicate a low-income community or community of color, low-income communities and communities of color are present in adjacent Census blocks. Pigeon Run Solar believes that the BESS will promote economic justice by contributing to the community through the creation of jobs and providing tax revenue to Campbell County which can be used to serve the needs of the County and its residents. As described in the response to question 12 in Appendix 1, the BESS is part of a larger Project that will produce economic benefits for the area.

Pigeon Run Solar also informed the community about the Project and solicited feedback. For example, Pigeon Run Solar hosted a public information meeting in October 2019 at the Gladys Community Center/Ruritan Club on Long Island Road. All adjacent and nearby property owners were mailed invitations to attend the meeting. Approximately 30 people attended the

meeting, including several members of the Board of Supervisors and Planning Commission. In addition, Pigeon Run Solar held several meetings with the County Board of Supervisors, Planning Commission, and County fire department where Pigeon Run Solar presented information concerning the Project and addressed questions concerning the effect of the Project on the community.

The BESS will have minimal impact to the environment, as more fully described in the DEQ Supplement, included as Appendix 2 to this Application, and the response to question 12 in Appendix 1. The BESS will be located on approximately 1.1 acres of cleared lands currently zoned agricultural. The BESS will not emit harmful air pollutants or GHGs and will reduce the need for traditional energy generating facilities, such as coal, natural gas, and oil power plants. Furthermore, the BESS will allow the Solar Facility to provide energy to the grid during periods when the photovoltaic panels cannot produce, thereby further decreasing the need for traditional fossil fuel sources of energy and the associated impacts of air pollutants, GHG emissions, and other discharges. No wetlands or other waters will be impacted by construction of the BESS. Erosion and sediment control measures and post-construction stormwater facilities will protect downstream waters from stormwater runoff. There will be no storage of hazardous materials at the BESS; therefore, it will not be a source of land pollution. There will be no odors produced by the BESS. There will be minimal noise produced by standard HVAC systems used to cool the BESS. This noise will not be audible beyond the limits of the Solar Facility. The BESS will be screened from adjoining public roads and residences by existing vegetation and supplemental plantings in areas where existing tree growth and topography along the Project Boundary do not effectively reduce visibility of the BESS.

For the foregoing reasons, the BESS does not adversely impact any goal established by

the Act.

3. Construction and Operation of the BESS Is Not Contrary to the Public Interest

The construction and operation of the BESS is not contrary to the public interest. Rather, as a part of the Project, the BESS will promote the public interest by providing economic benefits to Campbell County. Moreover, the BESS Project will have no material adverse effect on the reliability of electric service provided by any regulated public utility. As noted above, as a condition of Pigeon Run Solar's interconnection with Dominion, Pigeon Run Solar will be responsible for upgrades to the system (in accordance with agreements that are anticipated to be finalized among Pigeon Run Solar, PJM, and the transmission service provider) that PJM concludes are necessary to ensure reliable operation of the transmission system as specifically identified and set forth in the ISA.¹⁰ Pigeon Run Solar will comply with all necessary federal, state, and local environmental permits as required to construct and operate the BESS.¹¹

As described herein, the BESS (i) will have no material adverse effect upon reliability of electric service provided by any regulated public utility, (ii) will contribute to the diversity of competitive energy storage resources in the Commonwealth, (iii) will not affect the reliability of electric service provided by any regulated public utility in Virginia, (iv) will provide local economic benefits, and (v) will comply with all necessary federal, state, and local environmental permits. Moreover, the business risk associated with constructing, owning, and operating the BESS, which will not provide retail electric service in the Commonwealth and will not be

¹⁰ See *Application of Skipjack Solar Center, LLC, et al., For certificates of public convenience and necessity for solar generating facilities up to 320 MW in Charles City County, Virginia*, Case No. PUR-2019-00073, Order Granting Certificates at 15-16 (Mar. 5, 2020) ("Skipjack Solar Order") (the Commission determined that the solar project was not "contrary to the public interest" as contemplated by Code § 56-580 D, because, among other things, the record established that construction and operation of the proposed project would have no material adverse effect on reliability if the applicant funds and completes the upgrades PJM finds necessary for the Project); see also, *Pleinmont Solar Order* at 18 (the Commission determined that the solar project was not "contrary to the public interest" as contemplated by § 56-580 D of the Code).

¹¹ *Pleinmont Solar Order* at 18 and 19.

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included in the rate base of any incumbent electric utility, rests solely with Pigeon Run Solar.¹² The BESS is not contrary to the public interest. See Appendix 1, section 17 for further details.

IV. General

A. Request for Waiver from Filing Requirements

1. Filing Requirements. This Application is supported by the information contained in Appendix 1 in response to 20 VAC 5-335-80 C. The Commission shall consider requests for waivers of any provisions of Chapter 302 of the Virginia Administrative Code on a case-by-case basis and may grant waivers upon such terms and conditions as the Commission deems appropriate in the public interest.¹³ Pigeon Run Solar respectfully requests waiver, pursuant to 20 VAC 5-335-130, of the applicability of any filing requirement that may apply to this proceeding, to the extent that Pigeon Run Solar has not provided such information in its Application.

As Pigeon Run Solar will not be subject to any provisions of the Code that regulate the rates and service of public utilities that supply retail electric service, Pigeon Run Solar requests waiver of certain information required in 20 VAC 5-335 C. As noted above, the BESS will not serve any Virginia electric supply customers and the costs of the BESS will not be included in the base rates of any utility regulated by the Commission. Further, Pigeon Run Solar intends to file a notice with FERC to certify that it is an EWG. As such, Pigeon Run Solar anticipates that FERC will authorize it to sell energy, capacity, and ancillary services at market-based rates. Because Pigeon Run Solar will sell electricity for resale, it will be subject to FERC's jurisdiction. Therefore, Pigeon Run Solar's rates and services will be regulated by FERC, and not by the

¹² *Id.* See also Skipjack Solar Order at 15-16.

¹³ See, e.g., *James River Cogeneration Company, For a Certificate to Operate as an Electric Generating Facility Pursuant to Virginia Code § 56-580 D*, Case No. PUE-2007-00092, Final Order at 6, (Jan. 9, 2008) (The Commission granted waivers, pursuant to 20 VAC 5-302-10 *et seq.*, of any filing requirement that may have applied, to the extent that the applicant did not provide such information in its application).

Commission. In addition, none of Pigeon Run Solar's direct or indirect owners is affiliated with an incumbent electric utility as defined in § 56-576 of the Code. The Project will not serve any Virginia electric retail customers, and the costs of the Project will not be included in the base rates of any utility regulated by the Commission.

Specifically, Pigeon Run Solar respectfully requests a waiver of the requirement to provide certain information required by 20 VAC 5-335-80 C as set forth below:

7. Specific information about the proposed facility, including:
 - c. Estimated costs, and schedule for construction, testing and commercialization.
 - Pigeon Run Solar respectfully requests waiver of the requirement to provide estimated cost information. However, Pigeon Run Solar has provided a schedule for construction, testing and commercialization.
8. A general discussion of the selection process for the energy storage technology, including a description of any competitive procurement processes used.
 - Pigeon Run Solar respectfully requests a waiver of the requirement to provide a description of any competitive procurement process that may have been used in the past or may be used in the future regarding the selection process for the energy storage technology. However, Pigeon Run Solar has provided the selection process for the energy storage technology.

B. Extraordinarily Sensitive Information

The **EXTRAORDINARILY SENSITIVE** Supplement to this Application is being filed under seal with the Clerk of the Commission pursuant to Rule 170 of the Commission's Rules of Practice and Procedure, 20 VAC 5-20-170, and Rule 120 of the Commission's Regulations Governing the Deployment of Energy Storage, 20 VAC 5-335-120, along with a separate Motion for Protective Order and Additional Protective Treatment.

C. Communications

All service and correspondence concerning this Application should be addressed to the following:

Pauline Ung, Esq.
 Vice President, Legal
 174 Power Global
 200 Spectrum Center Drive
 Suite 1020
 Irvine, CA 92618
 Tel: (917) 297-8671
 pauline.ung@174powerglobal.com

Robert F. Riley
 Bradley J. Nowak
 Williams Mullen
 1666 K Street NW
 Suite 1200
 Washington DC 20006
 Tel: (202) 833-9200
 rriley@williamsmullen.com
 bnowak@williamsmullen.com
Counsel for Pigeon Run Solar, LLC

Garland S. Carr
 Williams Mullen
 Williams Mullen Center
 200 South 10th Street, Suite 1600
 Richmond, Virginia 23219
 Tel: (804) 420-6396
 gcarr@williamsmullen.com
Counsel for Pigeon Run Solar, LLC

V. Relief Requested

WHEREFORE, as described in the Application, Pigeon Run Solar respectfully requests that the Commission issue an order granting Pigeon Run Solar (i) a Permit to construct, own, and operate the BESS pursuant to 20 VAC 5-335-80 C, and (ii) such other authority, approval, waivers, or relief as may be appropriate under the law and the Commission's rules and regulations.

Dated at Richmond, Virginia, this 22nd day of February 2021.

Respectfully submitted,

PIGEON RUN SOLAR, LLC

By: /s/ Robert F. Riley
 Title: Counsel for Applicant

Garland S. Carr
 Williams Mullen
 200 South 10th Street, 16th Floor
 Richmond, Virginia 23219
 Tel: (804) 420-6446
 Email: gcarr@williamsmullen.com

Robert F. Riley
 Bradley J. Nowak
 Williams Mullen
 1666 K Street N.W., Suite 1200
 Washington, DC 20006
 Tel: (202) 833-9200
 Email: rriley@williamsmullen.com
 Email: bnowak@williamsmullen.com

CERTIFICATE OF SERVICE

I hereby certify that on this 22nd day of February, 2021, a copy of the Application of Pigeon Run Solar, LLC for a permit to construct, own and operate an energy storage facility was delivered by hand or mailed, first-class, postage prepaid, to the following:

William H. Chambliss, Esq.
State Corporation Commission
Tyler Building, 10th Floor
1300 E. Main Street
Richmond, Virginia 23219

C. Meade Browder, Jr., Esq.
Division of Consumer Counsel
Office of Attorney General
202 N. 9th Street, 8th Floor
Richmond, Virginia 23219-3424

/s/ Robert F. Riley

Robert F. Riley
Williams Mullen
1666 K Street NW, Suite 1200
Washington DC 20006
Tel: (202) 833-9200
rriley@williamsmullen.com
Counsel for Pigeon Run Solar, LLC

Exhibit A

Campbell County

Virginia

Exhibit A

November 23, 2020

Mr. Bernard J. Logan,
Interim Clerk, State Corporation Commission
c/o Document Control Center
1300 East Main Street
Tyler Building - First Floor
Richmond, Virginia 23219

Office of the County Administrator

Frank J. Rogers

P.O. Box 100, Rustburg, VA 24588

administration@campbellcountyyva.gov

Phone: 434-332-9525; 592-9525; 283-9525

Fax: 434-332-9617

Re: Pigeon Run Solar Project; Campbell County, Virginia

Dear Mr. Logan:

Please accept this letter on behalf of Campbell County to be filed with the Virginia State Corporation Commission in conjunction with Pigeon Run Solar, LLC's (Pigeon Run Solar) application to build and operate a proposed 20 MW battery energy storage system.

- On August 4, 2020, the Board of Supervisors unanimously approved a Special Use Permit for Pigeon Run Solar's facility which includes photovoltaic solar arrays and the battery energy storage system.
- The project will supply electricity to more than 13,000 local Virginia homes and will provide approximately \$1.6 million in property tax revenue over the 30-year life of the project.
- The construction of the solar and battery energy storage system facilities will employ approximately 180 people during construction and then on-going employment for maintenance, remote and on-site operations workers and landscape workers.
- Campbell County is pleased to have Pigeon Run Solar provide the County and the State of Virginia with a long-term source of clean renewable energy, as well as the economic and environmental benefits that come with the project.
- Pigeon Run Solar's integration of batteries in a solar project allows a project to smooth the flow of generation output into the grid resulting in increased energy reliability as well as to increase the power delivered through the same electrical interconnection infrastructure, thus reducing the need for additional transmission and or distribution lines to serve the area.

For all of these reasons, Pigeon Run Solar's project is an important part of the development and growth of the County. As such, Campbell County continues to support the Pigeon Run Solar project and urges the Commission to provide any approvals that may be required.

Sincerely,



Frank J. Rogers IV, County Administrator

Governing with Vision

to be the most collaborative, professional, value-driven locality in Virginia

www.campbellcountyyva.gov

APPENDIX 1

**TO THE APPLICATION OF
PIGEON RUN SOLAR, LLC**

**For a permit to construct and operate
an energy storage facility**

Case No. PUR-2021-00035

Containing information in response to
20 VAC 5-335-80, *Permitting of non-utility energy storage facilities*¹

Filed: February 22, 2021

¹ Pigeon Run Solar, LLC is providing responses for the purposes of supporting its Application. To the extent the information requested is not currently available or is not applicable, Pigeon Run Solar, LLC has so noted herein.

20 VAC 5-335-80 C. Other than a Phase I or Phase II Utility, each person applying for a permit to construct and operate an energy storage facility with an energy storage power rating of one megawatt or greater shall file an application with the clerk of the commission. Applications shall include the following information:

1. Legal name of the applicant as well as any trade name.

The legal name of the applicant is Pigeon Run Solar, LLC ("Pigeon Run Solar"). Pigeon Run Solar does not have a trade name.

2. A description of the applicant's authorized business structure, identifying the state authorizing such structure and the associated date (e.g., if incorporated, the state and date of incorporation; if a limited liability company, the state issuing the certificate of organization and the date of issuance).

Pigeon Run Solar is a limited liability company organized under the laws of the state of Delaware. Pigeon Run Solar was formed on March 19, 2019. Pigeon Run Solar is registered to transact business in the Commonwealth of Virginia.

3. Name and business addresses of all principal corporate officers and directors, partners, and LLC members, as appropriate.

The sole member of Pigeon Run Solar is Hanwha Energy USA Holding Corporation d/b/a 174 Power Global LLC ("174 Power Global"). 174 Power Global is the sole Manager of Pigeon Run Solar (there are no officers appointed). The business address for 174 Power Global is 300 Spectrum Center Drive, Suite 1020, Irvine, CA 92618.

4. Financial information for the applicant, or principal participant in the project. If the applicant or principal participant is a private entity, financial information should include an analysis of the entity's financial condition and audited financial statements for the two most recent fiscal years, if available. If the applicant or principal participant is a public company, financial information should include a copy or a link to where a copy can be found on the internet of the entity's most recent stockholder report and most recent Securities and Exchange Commission Form 10-K. If such information is unavailable, provide evidence that applicant has the financial resources, or access to capital, necessary to complete the proposed project.

Pigeon Run Solar was formed for the purpose of developing, constructing, owning, and operating an approximately 60 megawatt ("MW") alternating current ("AC") photovoltaic solar electric generating project ("Solar Facility") and the associated battery energy storage system ("BESS") in Campbell County, Virginia. For purposes of this Application, the term "Project" includes the BESS and the Solar Facility. Pigeon Run Solar is a private company that does not yet have audited financial statements; as such, stockholder reports and Securities and Exchange Commission Form 10-K are not available.

Pigeon Run Solar is a wholly owned indirect subsidiary of 174 Power Global, which is a wholly owned indirect subsidiary within the Hanwha Group ("Hanwha Group"). 174 Power Global and Hanwha Energy Corporation ("Hanwha Energy") will provide the financial backing and technical expertise for the Pigeon Run Solar Project. Hanwha Energy is the parent company of 174 Power Global. The Hanwha Group is a Fortune Global 500 company deeply invested in the solar business and uniquely qualified to fully execute on project opportunities.

See **EXTRAORDINARILY SENSITIVE** Supplement for (i) Application Insert Section I. C; (ii) Attachment 4 a (an ownership overview); and (iii) Attachment 4 b (a list of projects that have been financed by 174 Power Global).

5. A discussion of the applicant's qualifications, including:

a. A summary of other projects developed and managed by the applicant. Include location, status, and operational history.

Pigeon Run Solar is a special-purpose entity organized solely to develop, construct, own, and operate the Project, including the BESS, and has not developed or managed other projects. A table showing the other projects developed and managed by Pigeon Run Solar's affiliates is attached as Appendix 1, Attachment 5 a.

b. A description of any affiliation with an incumbent electric utility as defined in § 56-576 of the Code of Virginia.

Pigeon Run Solar is not affiliated with an incumbent electric utility as defined in § 56-576 of the Code of Virginia ("Code").

c. A disclosure of any affiliate relationship with any other permit holder.

Pigeon Run Solar is not affiliated with any entity that holds a permit to build a battery energy storage facility in Virginia.

6. Specific information about the site for the proposed facility, including:

a. A written description of the location including identification of the city or county in which the facility will be constructed. Such description should be suitable for newspaper publication and sufficiently identify any affected areas.

The BESS will be located on approximately 1.1 acres in Campbell County, Virginia, within Pigeon Run Solar's Project site. The BESS facility will be located off Brookneal Highway (State Route 501) in Campbell County – Tax map 0010034955. The site is located at 37.158474 Latitude, -79.055644 Longitude.

b. A description of the site, and a topographic map depiction of the proposed site.

The BESS site is approximately 1.1 acres and is currently used to support agricultural row crops. A topographical map depiction of the proposed BESS site is attached as Appendix I, Attachment 6 b.

c. The status of site acquisition (e.g., purchase option, ownership).

Pigeon Run Solar holds an option to purchase the site from a private entity. Pigeon Run Solar will exercise the option and purchase the land prior to the commencement of construction activities.

d. A description of any applicable local zoning or land use approvals required and the status of such approvals.

On January 7, 2020, the Campbell County Board of Supervisors approved the rezoning and special use permit request # PL-19-192 to construct the Project. On May 29, 2020 Pigeon Run Solar resubmitted its special use permit application (previously approved January 7, 2020) to reflect several Project changes, including among other things, providing that the BESS will be located adjacent to the Project substation as opposed to distributed throughout the site. On August 4, 2020, the Campbell County Board of Supervisors approved special use permit # PL-20-102.

7. Specific information about the proposed facility, including:

a. Description of all major systems, including energy storage technology type and battery storage chemistry type, if applicable, intended uses, intended facility useful life, facility configuration, and expected suppliers of major components.

The BESS is an energy storage facility, an energy storage system, and an energy storage resource as such terms are defined in 20 VAC 5-335-20, and includes any equipment, other than a transmission or distribution line, needed to interconnect the energy storage resource to the utility's electric system. Such additional equipment includes, as applicable, all switchgear, transformers, inverters, switches, cables, wires, conductors, bus work, protection devices and systems, communication and control devices and systems, fire protection systems, and environmental protection systems and other related equipment.

Battery Storage Technical System Description

Battery storage can provide several services and functions which are needed by grid operators and load serving entities. Pigeon Run Solar anticipates that the proposed batteries will be AC-coupled and used primarily for energy shifting to create a dispatchable solar

energy power plant, however the design will allow utilization of the batteries in any fashion that best supports the mission to supply reliable power to customers. The BESS will provide flexibility to system dispatchers to meet customer demand by giving the operators better control of the plant. The proposed BESS will have a two- to four-hour duration and will be AC-coupled to the Solar Facility.

The BESS generally comprises four components: (i) cell, (ii) module, (iii) rack, and (iv) container. One battery rack consists of battery modules and each module is made of multiple individual battery cells. Each rack will have a Battery Protection Unit ("BPU") to protect the system. Multiple racks are combined into a container to increase the overall power of the system and fed into a power conversion unit. This complete system is controlled by an Energy Management System ("EMS") that coordinates and aggregates the functions of each subsystem.

Battery Specification

The battery modules are anticipated to be provided by Samsung (or equivalent), one of the largest suppliers of battery modules in the world. Samsung SDI is one of the market leaders in stationary energy storage systems. The Samsung Li-Ion energy storage system relies on advanced lithium nickel manganese cobalt oxide ("NMC") chemistry to provide a combination of high energy density, long life, low cost, and industry leading safety and reliability.

Power Conversion System ("PCS") Specification

The proposed PCS is manufactured by Power Electronics (or equivalent) and provides up to a maximum 98.8% round-trip efficiency. The PCS capacity has been designed with enough spare capacity so that the control system can be configured in a way that makes it easier to maintain the battery State of Charge.

The PCS can provide reactive power in addition to the active power which is produced by conversion of incoming battery power. The resulting apparent power which is defined by the PCS's nameplate rating is calculated using reactive power and active power. The PCS has the capability to support the grid by remaining online or by reactive power feed-in during a temporary change of the grid voltage beyond preset low voltage ("LV") and high voltage ("HV") thresholds. The PCS will also ride through abnormal frequency events with the capability of reducing the output power at high frequency scenarios.

Plant Control and Battery Technical Description

The BESS and Solar Facility power plant controllers can be directly connected to a Generator Management System via the supervisory control and data acquisition ("SCADA") system and the EMS. The SCADA system will communicate via a slave dataset to facilitate any third-party requirements for monitoring, dispatch, and control.

Battery Degradation and Cycling Capabilities

The battery degradation is highly dependent on the number of cycles that the system experiences. A charge cycle is a complete charge and discharge on a rechargeable battery. A cycle is also defined as the cumulation of partial discharges and charges where the state of

the charge of battery oscillates between the ranges of 100% and 0%. The total cycles per a given time period can be calculated by summing the real power discharged by the battery during that time period and dividing it by the capacity of the batteries. The discharges will be measured by the Battery Management System ("BMS"). Battery cycles can also be validated using a net generation output meter ("NGOM") which will measure both charging energy and discharging energy/power separately. All discharged energy can be summed then grossed up for losses to calculate the total output of the energy storage system. The number of cycles can be calculated taking the total output of the energy storage system and dividing it by the summed usable capacity of all connected battery modules integrated in the system.

When the system is allowed to cycle the batteries as much as 365 times per year, the battery capacity degradation is expected to be roughly 2% per year. Increased cycling, but at a shallower depth, will also preserve battery capacity. The Project's ability to cycle on and off, along with other operating limitations, will be configured in and controlled by the BESS EMS, which will function based upon the BESS's state of charge. Cycling limits of the battery system will be dictated by the battery manufacturer's warranty terms. The total life of the battery is expected to be twenty years.

b. Energy storage power rating, energy capacity, and storage duration.

The BESS capacity will be approximately 20 MW, with a duration of 2 to 4 hours (40 to 80 megawatt-hours).

c. Estimated costs, and schedule for construction, testing and commercialization.

Pigeon Run Solar respectfully requests waiver of the requirement to provide such estimated cost information. Pigeon Run Solar notes that the Commission does not require an applicant to provide cost information regarding the certification of electric generating facilities (i) with rated capacities of 50 MW or less, or (ii) renewable energy electric generating facilities with rated capacities equal to 100 MW or less.² As Pigeon Run Solar is not a regulated utility, the business risk associated with the BESS will be borne solely by Pigeon Run Solar, with no impact on the rates paid by Virginia ratepayers. Thus, the business risk associated with the cost of constructing, owning, and operating the BESS, which will not be included in the rate base of any incumbent electric utility and rests solely with Pigeon Run Solar.³

Construction of the BESS is anticipated to begin in the fourth quarter 2022. Testing of the

² See 20 VAC 5-302-25.

³ See *Application of Skipjack Solar Center, LLC, et al., For certificates of public convenience and necessity for solar generating facilities up to 320 MW in Charles City County, Virginia*, Case No. PUR-2019-00073, Order Granting Certificates at 15-16 (March 5, 2020); *Pleinmont Solar Order* at 18 and 19; *Application of C4GT, LLC, For certification of an electric generating facility in Charles City County pursuant to § 56-580 D of the Code of Virginia*, Case No. PUE-2016-00104, 2017 S.C.C. Ann. Rept. 378, Final Order at 11 (May 3, 2017) ("C4GT Order"); see also *Application of CPV Warren, LLC, For a certificate of public convenience and necessity for electric generation facilities in Warren County, Virginia*, Case No. PUE-2002-00075, Final Order at 17 (Mar. 13, 2003) ("CPV Warren Order").

BESS is anticipated to take place during the first and second quarter of 2023. The target in-service date for the BESS is the third quarter 2023. The foregoing draft schedule is based on current information and is subject to the Commission's approval of this Application.

d. Site layouts that provide for integration of energy storage systems with adequate spacing and property setback requirements incorporated.

Appendix 1, Attachment 6 b provides a conceptual site layout of the BESS.

e. Codes and standards to which the proposed facility will be constructed.

Underwriter Laboratories (UL)

- 1642 Standard for Lithium Batteries
- 1973 Standard for Batteries for Use in Stationary, Vehicle, and Light Electric Rail Applications
- 9540 Standard for Energy Storage Systems and Equipment
- 9540A Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems
- 1741 Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
- 508C Standard for Power Conversion Equipment

National Fire Protection Association (NFPA)

- 855 Standard for the Installation of Stationary Energy Storage Systems
 - 10 - Standard for Portable Fire Extinguishers (2013)
 - 12 - Standard on Carbon Dioxide Extinguishing Systems (2011)
 - 13 - Standard for the Installation of Sprinkler Systems (2013)
- 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances (2013)
- 70 National Electrical Code (2014)
- 72 Fire Alarm and Signaling Code (2013)
- 80 Standard for Fire Doors and Other Opening Protectives (2013)
- 2001 Standard on Clean Agent Fire Extinguishing Systems (2015)

International Fire Code (IFC)

- Section 1206 Electrical Energy storage Systems

International Electrotechnical Commission (IEC)

- IEC 62933-1 Electrical energy storage (EES) systems - Part 1: Vocabulary
- 62933-2-1 ESS Unit parameters and testing methods - General specification
- 62933-3-1 ESS, Planning and performance assessment of electrical energy storage systems

- 62933-5-1 Safety considerations for grid integrated ESS systems
- Fire Suppression to local codes
- Notifications/Alarms to local codes

f. Where applicable, the manner and location of the facility's interconnection to the transmission or distribution grid.

Pigeon Run Solar is progressing through the PJM Interconnection, L.L.C. ("PJM") interconnection process. Pigeon Run Solar has two pending PJM queue positions for the Project: AF2-404 (relating to the BESS) and AE2-185 (relating to the Solar Facility). See the response provided to question 14 (a) and (b) for additional and related information.

8. A general discussion of the selection process for the energy storage technology, including a description of any competitive procurement processes used.

174 Power Global continuously evaluates the utility scale storage market to keep abreast of the latest developments from dozens of vendors. This includes competitively bid and confidential RFPs for several projects and evaluating vendors with industry-wide confidential vendor RFIs. 174 Power Global has evaluated several storage technologies including multiple variants of Lithium-Ion, LFP, hydrogen, and flow batteries. For the BESS project, 174 Power Global has selected a nickel manganese cobalt (NMC)-based Lithium-Ion solution housed in outdoor containers. This technology was chosen because it is (i) the most mature (since 2016, over 1GW of NMC has been installed in the US alone); (ii) the most well understood (over 50% of grid scale batteries currently use NMC); and (iii) the most cost-effective solution available for the Pigeon Run Solar Project site. The NMC modules are placed in several containers near the substation. The containers are modular, feature fire suppression systems, sealed environments, HVAC, advanced battery/energy management systems and require no internal access. This results in a very stable, safe, and reliable energy storage system designed to work seamlessly with the solar resource.

Pigeon Run Solar respectfully requests a waiver of the requirement to provide a description of any competitive procurement process that may have been used in the past or may be used in the future regarding the selection process for energy storage technology.

9. A general discussion of economic development impacts of the project.

The Project will have a significant positive impact on the local economy and promote economic development. The BESS contributes to the efficiency of the Project thereby allowing the economic benefits of the entire Project to be realized.

The Project is expected to provide substantial local and regional benefits from renewable energy electric generation and storage construction jobs and millions of dollars in private infrastructure investment in Virginia. The Project represents an initial capital investment of approximately \$85 million. This is a significant private investment and economic

development project in Campbell County. The Project construction will create approximately 135 full-time equivalent jobs during construction and approximately four full-time equivalent local jobs during the 35-year operations phase of the Project. The Project will provide significant property tax revenue – approximately \$85,000 in the first year of operations and an average of approximately \$40,000 per year over the 35-year life of the Project. As noted above, the BESS contributes to the efficiency of the Project thereby allowing the economic benefits of the entire Project to be realized.

As such, jobs created during construction and operation of the Project will provide significant payroll benefits and have important indirect economic benefits both locally and regionally.⁴ In addition, other economic benefits will include the purchase of local supplies and services throughout Campbell County and the surrounding area.

Moreover, while the Project, including the BESS, will contribute in a positive manner to the local economy, it will not cause any significant population growth and therefore will have very little impact on local services and infrastructure. In addition, none of the capital costs of the BESS will be borne by electric ratepayers of the Commonwealth.⁵

10. A list of other local, state or federal government agencies whose requirements must be met in connection with the construction or operation of the project and a statement of the status.

Permit/approval	Activity	Agency/ Entity	Status
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⁴ See, e.g., Skipjack Order at 14 (finding that the solar project will likely generate direct and indirect economic benefits to the County as a result of employment and spending from construction and operation of the Project and the County will likely benefit from an increase in the local tax base; *Application of Foxhound Solar LLC, For approval and certification of certain electrical facilities associated with a small renewable energy project*, Case No. PUR-2019-00107, Final Order (Oct. 17, 2019) (construction of collection facilities will likely generate slight direct and indirect economic benefits to the County and the Commonwealth as a result of employment and spending from construction of said facilities and operation of the Project) ("Foxhound Order"); *Application of Pleinmont Solar, LLC et al.*, Case No. PUR-2017-00162, Order Granting Certificates (Aug. 8, 2018), finding that the project will likely generate direct and indirect economic benefits to the County and the Commonwealth as a result of employment and spending from construction and operation of the project and the County will likely benefit from an increase in the local tax base ("Pleinmont Solar Order"); *Application of Doswell Limited Partnership, For approval and certification of electric transmission facilities: Remington-Gordonsville 230 kV Double Circuit Transmission Line*, Case No. PUE-2015-00127, Final Order (June 1, 2016) (finding that the Doswell Facility is likely to produce economic benefits in terms of jobs, taxes, and revenues. The "[p]roject will provide economic benefits to Hanover County and the Commonwealth" and "is likely to create or support a number of jobs in the area and also may result in indirect benefits to the local community as a result of an increase in employment and incomes in the area.") ("Doswell Order").

⁵ With regard to the Commonwealth, the Commission's finding of economic benefits takes into consideration the fact that a project will be owned by a non-utility and that the capital costs of the project would be borne by private investors, not by a utility's customers. See, e.g., Pleinmont Solar Order at 16, footnote 77.

General Virginia Pollution Discharge Elimination System ("VPDES") VAR10	Water quality and quantity impacts associated with project construction	Virginia Department of Environmental Quality	To be submitted
Land Use Permit	Work within VDOT right-of-way	Virginia Department of Transportation	To be submitted
Sediment and Erosion Control Plan Approval	Stormwater Pollution Prevention Plan for managing associated stormwater runoff	Campbell County Department of Environmental Management	To be submitted
Land Disturbance Permit	Land disturbance permits for residential and commercial construction and for general land clearing projects	Campbell County Office of Environmental Management	To be submitted
Building Permit	Constructing, moving, altering, or demolishing a building or structure	Campbell County Building Inspections Office	To be submitted
Special Use Permit	Utility-scale solar facility use in the A-1 Zoning Districts	Campbell County Planning Commission	Approved August 2020
Market-based rate authority and exempt wholesale generator status	Market-based rate authority and exempt wholesale generator status	Federal Energy Regulatory Commission	To be submitted

- 11. An analysis of the environmental impact of the project. This analysis shall include the impacts on the environment and natural resources, analysis of alternatives considered, unavoidable adverse impacts, mitigation measures proposed to minimize unavoidable impacts, and any irreversible environmental changes. The information required by this subdivision shall be submitted to the Department of Environmental Quality, simultaneously with its filing with the commission, for coordination and review by state agencies responsible for environmental and natural resource protection. [To the extent any of the following information is not applicable to a particular project or technology, the applicant shall indicate it is not applicable.] The information shall identify:**

Pigeon Run Solar's responses to Section 11(a) – (n) are set forth in the "DEQ Supplement" prepared by Stantec Consulting Services, Inc., ("Stantec") which is attached to the Application as Appendix 2.

- a. Required air permits, expected restrictions, expected emissions, rates of emissions, and any needed emissions offsets or allowances.**

- b. Required permits for water withdrawals, expected restrictions, the amount of water estimated to be used, the source of such water, identification of a backup source of water, if any, and identification of any facilities that need to be constructed to provide such water.
 - c. Required permits for water discharge and potential impacts on regional water flows.
 - d. Required permits related to the wetlands and an identification of any tidal and nontidal wetlands located near the proposed site and how such wetlands will be impacted by applicant's proposed facility.
 - e. Impact of solid and hazardous wastes on local water resources.
 - f. Impact on natural heritage resources, and on threatened and endangered species.
 - g. Erosion and sediment control measures.
 - h. Archaeological, historic, scenic, cultural, or architectural resources in the area.
 - i. Chesapeake Bay Preservation Areas designated by the locality.
 - j. Wildlife resources.
 - k. Agricultural and forest resources and federal, local, state or private parks and recreation areas.
 - l. Use of pesticides and herbicides.
 - m. Geology and mineral resources, caves, and sinkholes.
 - n. Transportation infrastructure.
12. An analysis of the social impact of the project, including a general discussion of why the facility will not have a disproportionate adverse impact on "historically economically disadvantaged communities" as defined in § 56-576 of the Code of Virginia.

Pigeon Run Solar retained Stantec to assist in reviewing this question. A "historically economically disadvantaged community" is defined in Code § 56-576 as "(i) a community in which a majority of the population are people of color or (ii) a low-income geographic area."

Code § 56-576 defines a "community in which a majority of the population are people of color" as "a U.S. Census tract where more than 50 percent of the population comprises individuals who identify as belonging to one or more of the following groups: Black, African American, Asian, Pacific Islander, Native American, other non-white race, mixed race, Hispanic, Latino, or linguistically isolated." The U.S. Census tract for the BESS site indicates a population consisting of 22% people of color according to the 2014-2018

American Community Survey ("ACS") data.⁶ Therefore, the majority of the population in the vicinity of the BESS site is not people of color.

Code § 56-576 defines "low income-geographic area" as "any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service." According to the Virginia Housing Development Authority, 80% of the median income of Campbell County was \$38,600 in 2019.⁷ The BESS site lies within Census Block 2, Tract 208 of Campbell County. The 2019 five-year estimates for the median income for this Census block is \$45,500.⁸ However, a Census block adjacent to the BESS site would meet the low-income geographic area definition since the 2019 ACS five-year estimate for the median income is less than \$30,000. The BESS location is not within a qualified opportunity zone.

As more fully described in the DEQ Supplement, included as Appendix 2 to this Application, the BESS will have minimal impact to the environment. The BESS will be located on approximately 1.1 acres of cleared lands currently zoned agricultural. The facility will not emit harmful air pollutants or greenhouse gases ("GHG") and will reduce the need for traditional energy generating facilities, such as coal, natural gas, and oil power plants. Furthermore, the BESS will allow the Solar Facility to provide energy to the grid during periods when the photovoltaic panels cannot produce, thereby further decreasing the need for traditional fossil fuel sources of energy and the associated impacts of air pollutants, GHG emissions, and other discharges. No wetlands or other waters will be impacted by construction of the BESS. Erosion and sediment control measures and post-construction stormwater facilities will protect downstream waters from stormwater runoff. There will be no storage of hazardous materials at the BESS site; therefore, it will not be a source of land pollution. There will be no odors produced by the BESS. There will be minimal noise produced by standard HVAC systems used to cool the BESS. This noise will not be audible beyond the limits of the Solar Facility. The BESS will be screened from adjoining public roads and residences by existing vegetation and supplemental plantings in areas where existing tree growth and topography along the Project Boundary do not effectively reduce visibility of the BESS. As such, disproportionate adverse impacts to neighboring properties or historically disadvantaged communities, as defined in Code § 56-576, is not expected.

The construction of the BESS will bring additional income and jobs into Campbell County and tax revenue payable to Campbell County. This additional revenue can be used at the

⁶ See, the U.S. Environmental Protection Agency (EPA) EJ Screen Summary Report for Census Tract 208 accessed on January 29, 2021. <https://ejscreen.epa.gov/mapper/>. EJSCREEN is an environmental justice mapping and screening tool provided by the EPA, which provides demographic and environmental information.

⁷ Virginia Development Housing Authority. Accessed on January 29, 2021. <https://www.vhda.com/BusinessPartners/PropertyOwnersManagers/Income-Rent-Limits/Income%20and%20Rent%20Limits%20Archive/HUD-Income-Limits-2019.pdf>

⁸ 2019 American Community Survey 5-year Estimates. Accessed on January 29, 2021. https://data.clarionledger.com/american-community-survey/block_group_2_census_tract_208_campbell_county_virginia/median-household-income/total/num/15000US510310208002/

discretion of the County to help address the needs of the County and its residents. The BESS contributes to the efficiency of the Solar Facility thereby contributing to the economic benefits of the entire Project. These economic benefits can be used to help the historically disadvantaged communities in the area. Based on all of the foregoing, the BESS will not have a disproportionately adverse impact on historically economically disadvantaged communities.

13. A general discussion of how the project will promote environmental justice in environmental justice communities and fenceline communities consistent with the Virginia Environmental Justice Act (§ 2.2-234 *et seq.* of the Code of Virginia).

The Virginia Environmental Justice Act, Code § 2.2-234 *et seq.* (the "Act") defines environmental justice communities as "any low-income community or community of color." The Act defines "low-income community" as any census block group in which 30 percent or more of the population is composed of people with low income." Further, the Act defines "low income" as "having an annual household income equal to or less than the greater of (i) an amount equal to 80 percent of the median income of the area in which the household is located, as reported by the Department of Housing and Urban Development, and (ii) 200 percent of the Federal Poverty Level."

Pigeon Run Solar retained Stantec to review the BESS vis-à-vis the Act. The Census block in which the BESS is located would not be considered a low-income community because less than 30% of the population is composed of people with low income, according to the 2014-2018 ACS data.⁹ However, the adjacent Census blocks would qualify and therefore, low-income communities are considered present.

The Act defines a "community of color" as a "geographically distinct area where the population of color, expressed as a percentage of the total population of such area, is higher than the population of color in the Commonwealth expressed as a percentage of the total population of the Commonwealth. However, if a community of color is composed primarily of one of the groups listed in the definition of "population of color," the percentage population of such group in the Commonwealth shall be used instead of the percentage population of color in the Commonwealth."

Using the definitions provided in the Act, the Census block in which the BESS will be located would not be considered a community of color because according to the 2014-2018 ACS data, the percentage population group primarily comprising the population of color is less than the percentage of that population within the Commonwealth.¹⁰ However, adjacent Census blocks would qualify and therefore, communities of color are considered present.

⁹ See, the U.S. Environmental Protection Agency (EPA) EJ Screen Summary Report for Census Tract 208 accessed on January 29, 2021. <https://ejscreen.epa.gov/mapper/>. EJSCREEN is an environmental justice mapping and screening tool provided by the EPA, which provides demographic and environmental information.

¹⁰ See, the U.S. Census Bureau quick facts for Virginia, accessed on February 12, 2021. <https://www.census.gov/quickfacts/VA>. This summary provides population estimates for Virginia as of July 2019, and estimates the black population comprises 19.9 percent of the Commonwealth's population.

The Act defines a fenceline community as "an area that contains all or part of a low-income community or community of color and that presents an increased health risk to its residents due to its proximity to a major source of pollution." The BESS is not a major source of pollution and no major sources of pollution are present within one mile of the BESS. As such, fenceline communities are not considered to be present within the vicinity of the BESS.

While the Census block in which the BESS will be located does not indicate a low-income community or community of color, low-income communities and communities of color are present in adjacent Census blocks. Pigeon Run Solar believes that the BESS will promote economic justice by contributing to the community through the creation of jobs and providing tax revenue to Campbell County which can be used to serve the needs of the County and its residents. As described in the response to question 12 above, the BESS is part of a larger Project that will produce economic benefits for the area.

Pigeon Run Solar also informed the community about the Project and solicited feedback. For example, Pigeon Run Solar hosted a public information meeting in October 2019 at the Gladys Community Center/Ruritan Club on Long Island Road.¹¹ All adjacent and nearby property owners were mailed invitations to attend the meeting. Approximately 30 people attended the meeting, including several members of the Board of Supervisors and Planning Commission. In addition, Pigeon Run Solar held several meetings with the County Board of Supervisors, Planning Commission, and County fire department where Pigeon Run Solar presented information concerning the Project and addressed questions concerning the effect of the Project on the community.

The BESS will have minimal impact to the environment, as more fully described in the DEQ Supplement, included as Appendix 2 to this Application, and the response to question 12 above. The BESS will be located on approximately 1.1 acres of cleared lands currently zoned agricultural. The BESS will not emit harmful air pollutants or GHGs and will reduce the need for traditional energy generating facilities, such as coal, natural gas, and oil power plants. Furthermore, the BESS will allow the Solar Facility to provide energy to the grid during periods when the photovoltaic panels cannot produce, thereby further decreasing the need for traditional fossil fuel sources of energy and the associated impacts of air pollutants, GHG emissions, and other discharges. No wetlands or other waters will be impacted by construction of the BESS. Erosion and sediment control measures and post-construction stormwater facilities will protect downstream waters from stormwater runoff. There will be no storage of hazardous materials at the BESS; therefore, it will not be a source of land pollution. There will be no odors produced by the BESS. There will be minimal noise produced by standard HVAC systems used to cool the BESS. This noise will not be audible beyond the limits of the Solar Facility. The BESS will be screened from adjoining public roads and residences by existing vegetation and supplemental plantings in areas where

¹¹ In October 2019, the Project design incorporated a distributed battery energy storage component and it was anticipated that the BESS would be approximately 50 MW with batteries distributed throughout the Solar Facility site. However, as described herein, the BESS design was substantially reduced in scope such that the BESS will be only approximately 20 MW and will be located adjacent to the Project substation (and not distributed throughout the Solar Facility site).

existing tree growth and topography along the Project Boundary do not effectively reduce visibility of the BESS.

For the foregoing reasons, not only will there be no adverse environmental impacts on environmental justice communities, the environmental and economic benefits of the BESS will help to promote environmental justice in environmental justice communities and fence line communities near the project location. Therefore, the BESS will promote environmental justice in environmental justice communities and fence line communities consistent with the Act.

14. A general discussion of reliability impacts including:

a. A description of interconnection requirements and needed interconnection facilities. Any such facilities shall be depicted on a topographic map.

Pigeon Run Solar's Project is progressing through the PJM interconnection process. Pigeon Run Solar has two pending PJM queue positions for the Project: AE2-185 relates to the Solar Facility portion of the Project and AF2-404 relates to the BESS portion of the Project. Both are described below.

In early 2019, 174 Power Global Properties, LLC (an affiliate of Pigeon Run Solar) submitted to PJM a request to interconnect 60 MW AC of solar generation. PJM assigned queue No. AE2-185 to this request. Subsequently, in early 2020, 174 Power Global Properties, LLC submitted an interconnection request for 20 MW x 4 hr (i.e., 80 MWhs) of AC-coupled batteries. PJM assigned queue No. AF2-404 to this request. Specifically, AF2-404 requests interconnection of the BESS through a common bus attached to the low side of the dedicated 34.5/69kV main power transformer for the Solar Facility portion of the Project requested under AE2-185. No grid charging was requested under AF2-404; the BESS will be charged from the solar generation associated with AE2-185 by means of the common bus.

In July 2020, PJM completed the Generation Interconnection Feasibility Study Report ("Feasibility Report") for AF2-404 attached as Appendix 1, Attachment 14 a. The Feasibility Report indicates that no additional interconnection facilities are required for the BESS (see section 6, page 5 of the Feasibility Report). As such, Pigeon Run Solar would not be responsible for any physical attachment facility costs and further, no total system network upgrades (or costs) relating to the BESS are required (see section 5, page 4 of the Feasibility Report).

The location of the interconnection facilities is depicted on Appendix 1, Attachment 6 b (which includes topographic map).

See the answer provided to question 14(b) for related information.

b. A description of the potential impact of the proposed facility on the interconnected system. Discussion should identify and summarize any system impact studies or proposed studies.

As noted above, Pigeon Run Solar is progressing through the PJM interconnection process. Pigeon Run Solar has two pending PJM queue positions for the Project: AE2-185 for the Solar Facility portion of the Project and AF2-404 for the BESS portion of the Project.

AE2-185 (Solar Facility portion of the Project) - 174 Power Global Properties, LLC (an affiliate of Pigeon Run Solar) filed an application with PJM that proposed a solar/storage generating facility located in Campbell County, Virginia. The installed facilities will have a total capability of 60 MW with 36 MW of Capacity Injection Rights (or "CIRs"). In February 2020, PJM completed the Generation Interconnection Impact Study Report, which was subsequently revised in May of 2020. PJM is currently processing the Generation Interconnection Facilities Report. AE2-185 will interconnect with the Dominion transmission system tapping the Gladys DP to Stonemill Switching Station 69 kV line. (See PJM's AE2-185 Impact Study at page 5).

AF2-404 (BESS) - 174 Power Global Properties, LLC (an affiliate of Pigeon Run Solar) filed an application with PJM that proposed adding a storage component to solar generation project with PJM interconnection queue No. AE2-185 and located in Campbell County, Virginia. PJM indicates that AF2-404 will be a 20 MW storage project. In July 2020, PJM completed the AF2-404 Feasibility Report. The PJM AF2-404 Feasibility Report is attached as Appendix 1, Attachment 14 a. The BESS will interconnect with the Dominion transmission system as an uprate to AE2-185, which interconnects via a tap to Dominion's 69kV Gladys DP – Stonemill transmission line as noted above. PJM is currently processing the Generation Interconnection Impact Study Report for AF2-404 (the BESS).

c. A description of anticipated services that may be provided to any transmission service provider or local distribution company, including associated costs and benefits.

No additional services are anticipated at this time.

d. A discussion of existing and expected generation reserves in the region and the impact of the proposed facility on such reserves.

The Project is being developed as a result of anticipated procurement needs of PJM member utilities, local electric cooperatives, and commercial and industrial clients, with a specific requirement of renewable energy and/or battery storage, with delivery in the Virginia markets.

15. A discussion of safety measures the applicant will implement, including fire and explosion protection, detection and mitigation measures, and an emergency response plan, as well as a discussion of whether such measures are compliant with all applicable codes and standards.

Pigeon Run Solar will develop a site-specific emergency response plan as part of the BESS detailed design and such plan will be compliant with all applicable codes and standards. There are three main categories of lithium-ion battery failures: Electrical, Mechanical, and Thermal. One may also consider a fourth category of "human error," which could be the

source of the above three categories. Each of these failures is briefly addressed below along with the mitigation techniques used in other 174 Power Global BESS projects.

Failure Category	Failure	Mitigation
Electrical Failure	Overcharge or undercharge based on catastrophic inverter failure.	There are multiple fuses and disconnect switches inside the battery containers that will protect the battery from fault current coming from the power conversion system ("PCS"). In the event of a catastrophic failure these devices will isolate the battery container from the inverter.
Mechanical Failure	Physical damage onsite due to heavy impact during maintenance (internal short circuit)	Hiring of qualified and reputable operations and maintenance ("O&M") company. Testing to be done after any O&M activity.
	Physical damage due to impact during transport (internal short circuit)	Both 174 Power Global, and representatives from the BESS provider and system integrator will inspect and supervise the installation of the batteries. Battery installation to be performed by qualified personnel only.
	Manufacturing defect (internal short circuit) that affects multiple cells	The 174 Power Global team will run rigorous commissioning and testing experiments to verify that the batteries are operating as intended.
Thermal Failure	Overheating (due to power outage)	Backup generators on site will supply power to the BESS HVAC systems during station blackout, or the system will be thermally designed per the original equipment manufacturer ("OEM") specifications to withstand a blackout.
	Overheating (due to HVAC failure)	There are multiple AC units inside each battery container. Up to one may fail before battery temperature exceeds operational range. In the event of a total failure the batteries will trip offline and internal heat generation will virtually cease.

	Overheating from short circuit and/or electrical/mechanical failures above	BMS (battery management system) installed to monitor and shut down batteries before a fire. An active fire suppression system installed in each container for worst case scenario. Each module has a fusible busbar and each cell has an internal fuse designed to mitigate cascading failures and stop/slow the spread of heat and flame to its neighbors.
Human Error	Human error during commissioning, installation, repair, or operating activities	Attention to safety, multiple testing and commissioning procedures to test system functionality and safety. Installation, testing, operation and maintenance of the BESS systems to be performed by trained and qualified personnel. Safety briefings discussing the sensitive nature of Li-ion battery technology to be held prior to all activities and operational evolutions.

Service to be performed	Frequency
Inspect and test all switches, fuses, and disconnects.	Annually
Inspect HVAC filters, vents, oil, and refrigerant charge	Annually
Verify mechanical integrity of enclosures/buildings	Annually
Inspect fire detection & suppression system for defects such as over-discharged batteries or loss of charge in suppression tanks	Annually
Inspect and diagnose status of emergency and safety sub-systems and backup power	Annually
Check torque marks and re-tightening appropriate wiring connections to design specification torque force per manufacturer's guidelines.	Annually
Perform thermal imaging and address connections and hot spots.	Annually
Perform BESS preventive maintenance per manufacturer's Owner Manual.	Annually per system requirements
Perform BESS PCS preventive maintenance per manufacturer's Owner Manual.	Annually per system requirements
Inspect BMS data for early warning signs.	Annually

In addition to the mitigation standards above, the BESS will also have automated 24/7 monitoring and the ability to automatically isolate battery strings through the energy management system (EMS) and BMS operation. The EMS and BMS are integrated with the plant SCADA system and will be programmed for safety and reliability. It will also feature all applicable safety standards and UL Ratings. The batteries will be placed in containers (as opposed to in a building or other less fire safe structure). The containers will be placed far enough away from any other structures or flammable materials. Each of these containers is equipped with its own fire suppression system.

16. A discussion of the projected useful life of the energy storage facility, including known or projected performance degradation, roundtrip efficiency, and the proposed plan for and cost of decommissioning at the end of the facility's useful life.

Pigeon Run Solar anticipates that the BESS will have a useful life of approximately 20 years, which can be extended to approximately 35 years with battery replacement. The round-trip efficiency of the BESS is anticipated to be approximately 85%. During this time the batteries will be routinely augmented to ensure that there is minimal degradation to the capacity and performance.

Battery Degradation and Cycling Capabilities

Battery degradation is highly dependent on the number of cycles that the system experiences. A charge cycle is a complete charge and discharge on a rechargeable battery. A cycle is also defined as the cumulation of partial discharges and charges where the state of the charge of the battery oscillates between the ranges of 100% and 0%. The total cycles per a given time period can be calculated by summing the real power discharged by the battery during that time period and dividing it by the capacity of the batteries. The discharges will be measured by the BMS. Battery cycles can also be validated using a net generation output meter ("NGOM") which will measure both charging energy and discharging energy/power separately. All discharged energy can be summed then grossed up for losses to calculate the total output of the energy storage system. The number of cycles can be calculated taking the total output of the energy storage system and dividing it by the summed usable capacity of all connected battery modules integrated in the system.

When the system is allowed to cycle the batteries as much as 365 times per year, the battery capacity degradation is expected to be roughly 2% per year. Increased cycling, but at a shallower depth will also preserve battery capacity. Photovoltaic ("PV") projects are limited by the available energy provided by the PV modules. The BESS's ability to cycle on and off, along with other operating limitations, will be configured in and controlled by the BESS EMS, which will function based upon the BESS's state of charge. Cycling limits of the battery system will be dictated by the battery manufacturer's warranty terms.

Decommissioning

Pigeon Run Solar is committed to providing a decommissioning process that is safe, sustainable, and environmentally friendly manner. The process includes:

- i. Decommissioning the BESS software, discharging all batteries, and shutting down all of the management systems.
- ii. Removing the battery modules from the containers.
- iii. Delivering the battery modules back to the OEM (or to a third-party recycler). The OEM has programs in place to receive the batteries, break them down, and salvage all usable material.
- iv. After the battery modules have been removed from the containers, the containers can be recycled/salvaged. The containers are made of steel and have value for reuse/recycling. After all the racks and steel have been salvaged, a negligible residual amount of material is anticipated.
- v. The final step is to take care of any required civil work to decommission the foundations.

17. A discussion of whether the proposed facility is not contrary to the public interest. The discussion shall include an analysis of any reasonably known impacts the proposed facility may have upon reliability of service to and rates paid by customers of any regulated public utility providing electric service in the Commonwealth.

The BESS is not contrary to the public interest:

- The Project, including the BESS, will promote the public interest by providing substantial local and regional benefits from renewable energy electric generation and storage construction jobs and millions of dollars in private infrastructure investment in Virginia. The Project represents an initial capital investment of approximately \$85 million. This is a significant private investment and economic development project in Campbell County. The Project construction will create approximately 135 full-time equivalent jobs during construction and approximately four full-time equivalent local jobs during the 35-year operations phase of the Project. The Project will provide significant property tax revenue, approximately \$85,000 in the first year of operations and an average of approximately \$40,000 per year over the 35-year life of the Project. As noted above, the BESS contributes to the efficiency of the Project thereby allowing the economic benefits of the entire Project to be realized.¹²

¹² See, e.g., Skipjack Order at 14 (finding that the solar project will likely generate direct and indirect economic benefits to the County as a result of employment and spending from construction and operation of the project and the County will likely benefit from an increase in the local tax base); Foxhound Order (Oct. 17, 2019) (construction of collection facilities will likely generate slight direct and indirect economic benefits to the County and the Commonwealth as a result of employment and spending from construction of said facilities and operation of the Project); Pleinmont Solar Order at 16 (finding that the project will likely generate direct and indirect economic benefits to the County and the Commonwealth as a result of employment and spending from construction and operation of the project and the County will likely benefit from an increase in the local tax base); Doswell Order at 12, (finding that the Doswell "[p]roject will provide economic benefits to Hanover County and the Commonwealth" and is "is likely to create or support a number of jobs in the area and also may result in indirect benefits to the local community as a result of an increase in employment and incomes in the area.")

- Jobs created during construction and operation of the Project, including the BESS, will provide significant payroll benefits and have important indirect economic benefits both locally and regionally. In addition, other economic benefits will include the purchase of local supplies and services throughout Campbell County and the surrounding area.
- Construction of the BESS will generate direct and indirect economic benefits to Campbell County and the Commonwealth as a result of employment and spending from construction of the BESS and operation of the Project.¹³
- While the Project, including the BESS, will contribute in a positive manner to the local economy, it will not cause any significant population growth and therefore will have very little adverse impact on local services and infrastructure. In addition, none of the capital costs of the BESS will be borne by electric ratepayers of the Commonwealth.
- The Project, including the BESS, will have a significant positive impact on the local economy and promote economic development. The Project is expected to provide substantial local and regional benefits from a new energy storage resource, renewable energy electric generation, construction jobs and millions of dollars in private infrastructure investment in Virginia.
- The Campbell County Board of Supervisors has approved a special use permit for the Project, including the BESS. The special use permit imposes numerous conditions including, among other things, vegetative buffers, a decommissioning plan and performance bond, setbacks, and construction traffic restrictions.
- The Project has received support from the community and local officials. See Letter from Frank J. Rogers, IV, County Administrator for Campbell, Virginia, dated November 23, 2020, Exhibit A to the Application.
- The construction and operation of the BESS will promote the public interest by, among other things, contributing to the viability of the Project thereby providing economic benefits to Campbell County, the surrounding area, and the Commonwealth by providing a source of new clean energy storage in Virginia.
- The integration of batteries in a solar project allows a project to smooth the flow of generation output into the grid resulting in increased energy reliability as well as to increase the power delivered through the same electrical interconnection infrastructure, thus reducing the need for additional transmission and or distribution lines to serve the area.
- None of the capital costs of the BESS will be borne by electric ratepayers in the Commonwealth. With regard to the Commonwealth, the Commission's finding of economic benefits takes into consideration the fact that a project will be owned by a non-utility and that the capital costs of the project will be borne by private investors, not by a utility's customers.¹⁴
- While substantial benefits accrue to the Commonwealth of Virginia, Campbell County, and the surrounding area, the business risk associated with constructing, owning, and operating the BESS, which will not provide retail electric service in the Commonwealth and will not be

¹³ See, e.g., Foxhound Order (Oct. 17, 2019) (construction of collection facilities will likely generate slight direct and indirect economic benefits to the County and the Commonwealth as a result of employment and spending from construction of said facilities and operation of the Project).

¹⁴ See, e.g., Pleimont Solar Order at 16, footnote 77.

included in the rate base of any incumbent electric utility, rests solely with Pigeon Run Solar.¹⁵

- The BESS will have no material adverse effect on the reliability of electric service provided by any regulated public utility. The PJM Feasibility Report indicates that no additional interconnection facilities are required for the BESS. As such, Pigeon Run Solar will not be responsible for any physical interconnection costs or total system network upgrade costs relating to the BESS.¹⁶
- The BESS will provide extensive benefits to Campbell County and the surrounding region including reliable on-demand storage with no emissions (See DEQ Supplement, Appendix 2).
- The BESS promotes the Commonwealth's recently enacted energy storage goals. During its 2020 Session, the Virginia General Assembly enacted the Virginia Clean Economy Act ("VCEA") which requires Appalachian Power Company ("APCo") and Virginia Electric and Power Company ("Dominion") to construct or acquire 400 MW and 2,700 MW of energy storage resources, respectively, by 2035.¹⁷ At least 35% of such storage requirements must be procured from third parties. Moreover, pursuant to Code § 56-585.5 E, Dominion and APCo must petition the Commission for approvals to construct or acquire energy storage resources. Pigeon Run Solar's BESS facility will be available to participate in those solicitations and contribute to the Energy Storage Targets.
- Code § 56-585.1 A 6 declares energy storage resources to be in the public interest: "Additionally, energy storage facilities with an aggregate capacity of 2,700 megawatts are in the public interest."
- The BESS will assist meeting the rising demand for storage resources using environmentally responsible lithium-ion battery resources.
- As an in-state resource, Pigeon Run Solar's BESS facilities, will improve reliability and its economic benefits will be retained in the Commonwealth of Virginia.
- The BESS facilities, will be designed, constructed and operated in a way to minimize any adverse environmental impact as more fully described in the DEQ Supplement attached as Appendix 2 to the Application. Among other things:
 - The BESS will not emit any harmful air pollutants or greenhouse gases during operations.
 - By providing stored energy generated from the photovoltaic solar facility, the BESS will help Virginia reduce the need for traditional energy generating facilities, such as coal, natural gas, and oil power plants and further reduce harmful emissions and air pollutants.
 - The BESS does not require any water source for its installation or operation
 - No stream features occur on the BESS site.
 - No wetland or waters of the U.S. have been identified within the BESS site.
 - No discharge of cooling waters is associated with the installation or operation of the BESS.
- The BESS will allow for a more efficient and secure electricity grid that is more resistant to disruptions.

¹⁵ See, e.g., Skipjack Order at 15-16; C4GT Order at 11; see also CPV Warren Order at 17 (finding that the facility is not otherwise contrary to the public interest in that "rates for the regulated public utility will not be impacted").

¹⁶ See section 5, page 4 of the Feasibility Report.

¹⁷ See Senate Bill 851, 2020 Va. Acts ch. 1194, and identical House Bill 1526, 2020 Va. Acts ch. 1193 (effective July 1, 2020), as codified in Code § 56-585.5 E ("Energy Storage Targets").

Appendix 1

Attachment 5 a.

Pigeon Run Solar, LLC

Appendix 1, Attachment 5a. Project Experience List

Listing of projects that have been developed, built, operated, and/or owned by Hanwha Energy and its affiliates around the world.

Projects Developed, Built, Operated, and/or Owned by Hanwha Energy Network							
Project Name	Project Location	MW Capacity (AC)	Type of Tech.	Mounting/ ESS size	Project Status	Project Operator	Project Owner
MMPA	MN	7	Solar PV	Ground	In Service/Sold	HEUH	HGC
SD Sun I	SD	20	Solar PV	Ground	Sold	Project developer: Hanwha Energy USA Holdings corp. (dba 174 Power Global)	
SD Sun II&III	SD	32	Solar PV	Ground	Sold		
Sweetwater	WY	100	Solar PV	Ground	In Service/Sold		
Midway	Texas	180	Solar PV	Ground	In Service/Sold		
Techren I	Nevada	100	Solar PV	Ground	In Service/Sold		
Techren II	Nevada	200	Solar PV	Ground	In Service/Sold		
Techren III	Nevada	25	Solar PV	Ground	Sold		
Techren IV	Nevada	25	Solar PV	Ground	Sold		
Techren V	Nevada	50	Solar PV	Ground	Sold		
Laguna Solar	Mexico	101	Solar PV	Ground	In Service	HEUH	HEUH
Imeson	Florida	6	PV+ESS	2MW/4MWh	In Service	HEUH	HEUH
Oberon 1A	Texas	150	Solar PV	Ground	In Service	HEUH	HEUH
Oberon 1B	Texas	30	Solar PV	Ground	In Service	HEUH	HEUH
Ho'Ohana	Hawaii	52	PV+ESS	52MW/208MWh	PPA Awarded	HEUH	HEUH
Guam 2nd	Guam	60	PV+ESS	32MW/67MWh	PPA Awarded	HEUH	HEUH
Gerdau	TX	80	Solar PV	Ground	PPA Awarded	HEUH	HEUH
Boulder Solar III	NV	128	PV+ESS	58MW/230MWh	PPA Awarded	HEUH	HEUH
Skysol	OR	55	PV	Ground	PPA Awarded	HEUH	HEUH
Rayos Del Sol	TX	179	PV	Ground	PPA Awarded	HEUH	HEUH
Astoria	NY	100	ESS only	100MW/400MWh	PPA Awarded	HEUH	HEUH
Kupeahu	HI	60	PV	60MW/240MWh	PPA Awarded	HEUH	HEUH
Black Hollow Sun	CO	150	PV	Ground	PPA Awarded	HEUH	HEUH
Silver Peak	NV	60	ESS only	60MW/240MWh	PPA Awarded	HEUH	HEUH

Projects Developed, Built, Operated, and/or Owned by Hanwha Energy Network

Project Name	Project Location	MW Capacity (AC)	Type of Tech.	Mounting/ ESS size	Project Status	Project Operator	Project Owner
Oberon II	TX	150	PV	Ground	PPA Negotiation	HEUH	HEUH
Oberon III	TX	50	PV	Ground	PPA Negotiation	HEUH	HEUH
Atlas	AZ	200	PV	Ground	PPA Negotiation	HEUH	HEUH
NY C&I	NY	30	Solar PV	91 projects	In Service	HEUH	HEUH
Kitsuki	Japan	24.5	Solar PV	Ground	In Service	HECJ	HECJ
Imabari	Japan	2.1	Solar PV	Ground	In Service	HECJ	HECJ
Accordia	Japan	7.1	Solar PV	Ground	In Service	HECJ	HECJ
Naka Nagamine	Japan	3.8	Solar PV	Ground	In Service	HECJ	HECJ
Hokota	Japan	0.8	Solar PV	Ground	In Service	HECJ	HECJ
Akiba	Japan	1.0	Solar PV	Ground	In Service	HECJ	HECJ
Awanishi	Japan	2.0	Solar PV	Ground	In Service	HECJ	HECJ
Higashi Nagamine	Japan	2.7	Solar PV	Ground	In Service	HECJ	HECJ
Nishi Nagamine	Japan	2.1	Solar PV	Ground	In Service	HECJ	HECJ
Kushiro Minami	Japan	2.8	Solar PV	Ground	In Service	HECJ	HECJ
Kushiro Kita	Japan	0.8	Solar PV	Ground	In Service	HECJ	HECJ
Kushiro Higashi	Japan	0.8	Solar PV	Ground	In Service	HECJ	HECJ
Monbetsu	Japan	6.0	Solar PV	Ground	In Service	HECJ	HECJ
Inashiki	Japan	0.6	Solar PV	Ground	In Service	HECJ	HECJ
Wakayama	Japan	17.6	Solar PV	Ground	In Service	HECJ	HECJ
Kogen1	Japan	31.5	Solar PV	Ground	In Service	HECJ	HECJ
Misasa	Japan	12.5	Solar PV	Ground	In Service	HECJ	HECJ
Aira	Japan	10.8	Solar PV	Ground	In Service	HECJ	HECJ
Ichihara	Japan	2.8	Solar PV	Ground	In Service	HECJ	HECJ
Fujiyishida	Japan	1.8	Solar PV	Ground	In Service	HECJ	HECJ
Sunny Side Hills	Japan	25.4	Solar PV	Ground	In Service	HECJ	HECJ
Kogen2	Japan	29.9	Solar PV	Ground	In Service	HECJ	HECJ
Kikuchi	Japan	6.4	Solar PV	Ground	In Service	HECJ	HECJ
Izu kogen	Japan	45.0	Solar PV	Ground	Construction	HECJ	HECJ
Shobara	Japan	16.3	Solar PV	Ground	Construction	HECJ	HECJ
Pine hills	Japan	34.9	Solar PV	Ground	Construction	HECJ	HECJ
Mashiki	Japan	1.9	Solar PV	Ground	Construction	HECJ	HECJ
Makino	Japan	1.2	Solar PV	Ground	Construction	HECJ	HECJ
Yokaichi	Japan	3.5	Solar PV	Ground	PPA Negotiation	HECJ	HECJ

Projects Developed, Built, Operated, and/or Owned by Hanwha Energy Network

Project Name	Project Location	MW Capacity (AC)	Type of Tech.	Mounting/ ESS size	Project Status	Project Operator	Project Owner
CAMLAM	Vietnam	99.1	Solar PV	Ground	In Service	HECVN	HECVN
LSS 2 nd	Malaysia	48	Solar PV	Ground	Construction	HECSG	HECSG
LSS 3 rd	Malaysia	155	Solar PV	Ground	PPA Negotiation	HECSG	HECSG
Azure UP	India	59	Solar PV	Ground	In Service	HEC	HEC
Primo	Turkey	32	Solar PV	Ground	In Service	HEC	HEC
Margtel	Spain	50	Solar PV	Ground	Construction	HECE	HECE
ABO Wind	Spain	82	Solar PV	Ground	Construction	HECE	HECE
Ignis A	Spain	950	Solar PV	Ground	Construction	HECE	HECE
Ecotec	Italy	200	Solar PV	Ground	Construction	HEC	HEC
Caltagirone	Italy	12.5	Solar PV	Ground	Construction	HECE	HECE
Gravina	Italy	17.5	Solar PV	Ground	Construction	HECE	HECE
Ireland FR	Ireland	200	ESS only	200MW/120MWh	Construction	HECE	HECE
Barcaldine	Australia	25	Solar PV	Ground	In Service	HEC AU	N/A
Bannerton	Australia	110	Solar PV	Ground	Construction	HEC AU	N/A
Gregadoo	Australia	53.7	Solar PV	Ground	PPA Negotiation	HEC AU	N/A
Jindera	Australia	147.7	Solar PV	Ground	PPA Negotiation	HEC AU	N/A
Yeosu	South Korea	250	Cogeneration	250MW+1,450t/h	In Service	HEC	HEC
Gunsan	South Korea	222	Cogeneration	222MW+935t/h	In Service	HEC	HEC
Daesan	South Korea	50	Hydrogen Fuel Cell		In Service	HEC	HEC
Total		5,442.21					

Notes: HEC = Hanwha Energy Corporation, HEUH = Hanwha Energy USA Holdings Corporation (dba 174 Power Global), HECJ= Hanwha Energy Japan, HEC AU = Hanwha Energy Australia, HGC = Hanwha General Chemical, HAM= Hanwha Advanced Materials

Listing of some of the Energy Storage projects that have been developed, built, operated, and/or owned by Hanwha Energy and its affiliates around the world.

Energy Storage Projects Developed, Built, Operated, Owned by Hanwha Energy Network

Project Name	Project Location	Type of Technology	ESS size	Project Status	COD	Bidder's role
Imeson	Florida	PV+ESS	2MW/4MWh	In Service	Oct.2019	Development, O&M
Ho'Ohana	Hawaii	PV+ESS	52MW/208MWh	PPA Awarded	May.2023	Development, O&M
Guam 2nd	Guam	PV+ESS	32MW/67MWh	PPA Awarded	Jun. 2023	Development, O&M

Energy Storage Projects Developed, Built, Operated, Owned by Hanwha Energy Network

Project Name	Project Location	Type of Technology	ESS size	Project Status	COD	Bidder's role
Boulder Solar III	Nevada	PV+ESS	58MW/232MWh	PPA Awarded	Sep.2023	Development, O&M
Kupehau	Hawaii	PV+ESS	60MW/240MWh	PPA Awarded	May.2023	Development, O&M
Astoria	New York	ESS Only	100MW/400MWh	PPA Awarded	Dec.2022	Development, O&M
Silver Peak	Nevada	ESS Only	60MW/240MWh	PPA Awarded	Aug.2022	Development, O&M
Ireland FR	Ireland	ESS	200MW/120MWh	Construction	Mar.2021	Development, EPC, O&M
Saemangeu	South Korea	PV+ESS	6MW/18MWh	In Service	Jan.2016	EPC, O&M
Daehyun	South Korea	PV+ESS	1MW/3MWh	In Service	Jul.2018	EPC, O&M
Seogok	South Korea	PV+ESS	1MW/3MWh	In Service	Jul.2018	EPC, O&M
Hanwha Sejong Factory	South Korea	PV+ESS	2MW/8MWh	In Service	Mar.2018	EPC
Hanwha Eumseong Factory	South Korea	PV+ESS	2MW/8MWh	In Service	Mar.2018	EPC
Hanwha DaeSan Factory	South Korea	Peak Cut	4MW/22MWh	In Service	Jun.2018	Development, EPC, O&M
Hanwha Yeosoo Factory	South Korea	Peak Cut	1MW/2MWh	In Service	Mar.2018	EPC
KD Solar One Project	South Korea	PV+ESS	1MW/3MWh	In Service	Mar.2018	EPC, O&M
Highway Solar Project	South Korea	PV+ESS	4MW/13MWh	In Service	Mar.2018	EPC, O&M
Chungmyoun	South Korea	PV+ESS	2MW/8MWh	In Service	Jun.2019	EPC, O&M
ES Power	South Korea	PV+ESS	2MW/8MWh	In Service	Jun.2019	EPC, O&M
PoCheon Changso	South Korea	PV+ESS	4MW/12MWh	In Service	Jul.2019	EPC, O&M
HanGyo PV+ESS	South Korea	PV+ESS	3MW/8MWh	In Service	Jul.2019	EPC, O&M
HanMaeum Energy	South Korea	PV+ESS	5MW/19MWh	In Service	Jul.2019	EPC, O&M
YoungGok	South Korea	PV+ESS	4MW/12MWh	In Service	Mar.2019	O&M
KT-KDB Infra(PV+ESS)	South Korea	PV+ESS	15MW/40MWh	In Service	Apr.2019	O&M
SamChulLee ES DaeBudo	South Korea	PV+ESS	0.3MW/1MWh	In Service	Dec.2019	EPC
YoungGwang BongNam	South Korea	PV+ESS	15MW/47MWh	In Service	Dec.2019	EPC, O&M

Energy Storage Projects Developed, Built, Operated, Owned by Hanwha Energy Network

Project Name	Project Location	Type of Technology	ESS size	Project Status	COD	Bidder's role
Goesan Solar Campus	South Korea	PV+ESS	12.5MW/40MWh	In Service	Dec.2019	Development, EPC, O&M
YoungGwang Hashari	South Korea	PV+ESS	87MW/312MWh	In Service	May.2020	EPC, O&M
Total			737.8MW/2102MWh			

The table below provides a listing of the O&M projects Hanwha Energy and its affiliates around the world are managing.

O&M Projects Currently In Service

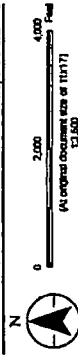
Region	Type	Contracted Capacity (MW)	# of Plants(contractured)
South Korea	PV, PV+ESS	PV 372.12MW, ESS 601.33MWh	52
South Korea	Co-Generation	472MW + 2,385t/h	2
Japan	PV	PV 244MW	18
Vietnam	PV	PV 99.1MW	1
US/Mexico	PV, ESS	PV 333.76MW, ESS 4MWh	55
Ireland	ESS	ESS 120MWh	1
Total	PV, PV+ESS	PV 1048.92MW, ESS 725.33MWh	127
	Co-Generation	472MW + 2,385t/h	2

Appendix 1

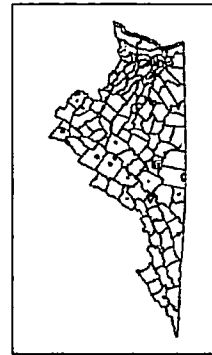
Attachment 6 b.

Attachment 6b

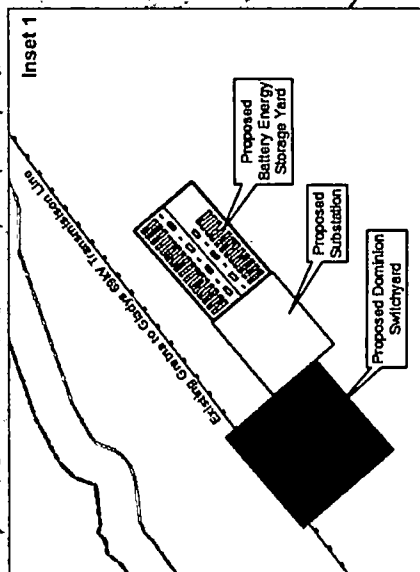
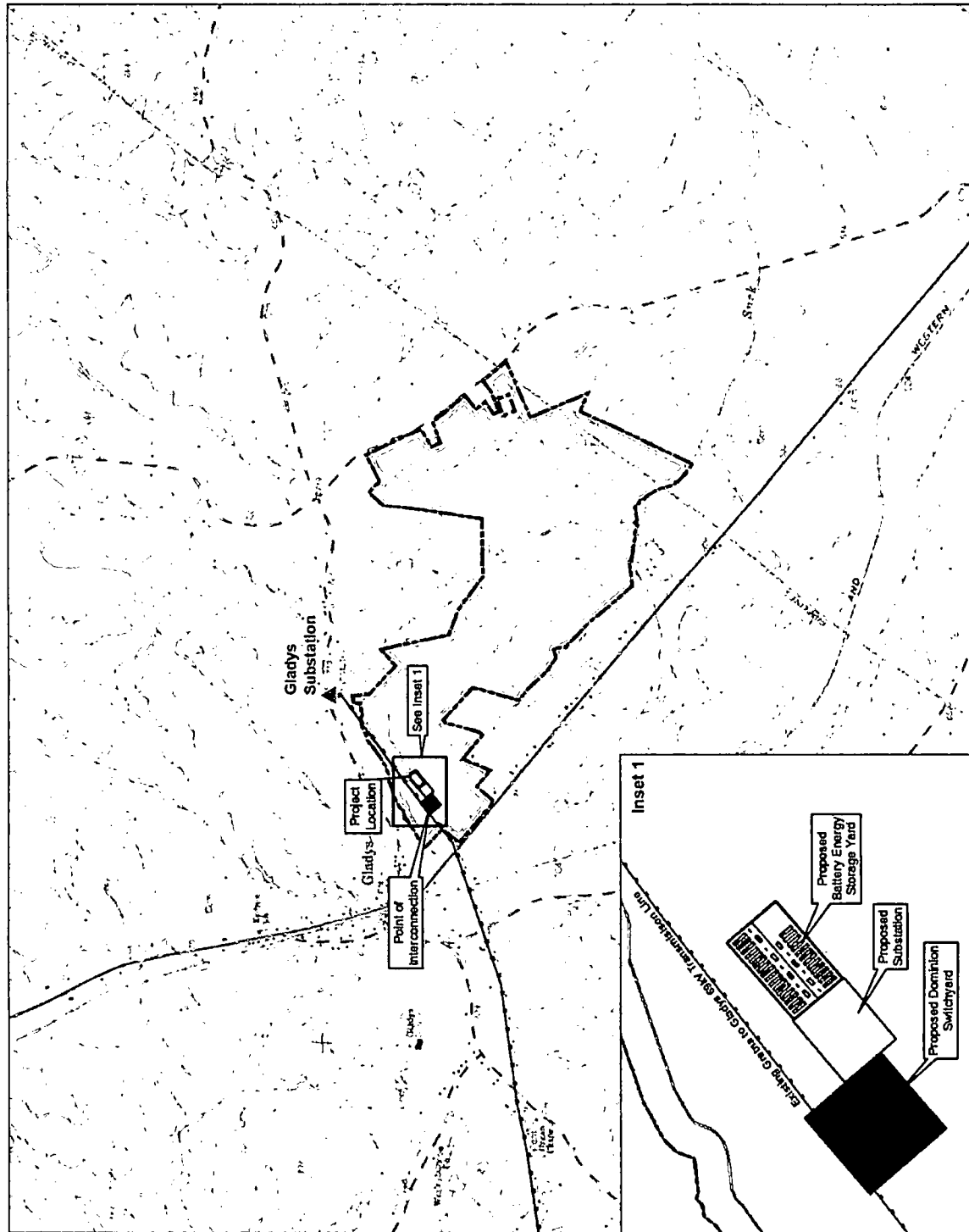
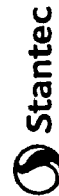
Draft Project
 Pigeon Run, LLC
 Pigeon Run Solar Site
 Project Location
 Prepared by: URS on 05/08/13
 Prepared by: URS on 05/08/13
 Prepared by: URS on 05/08/13
 Prepared by: URS on 05/08/13



- Existing Substation
- Existing Gladys to Gladys 69KV Transmission Line
- Proposed Battery Energy Storage System Site
- Proposed Substation
- Proposed Switchyard
- Pigeon Run Solar Facility Boundary
- 100-Foot Setback

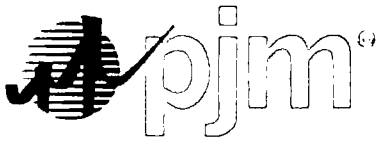


Pigeon Run, LLC, 1000 South Street, Suite 100, Chesapeake, VA 23041
 Pigeon Run, LLC, 1000 South Street, Suite 100, Chesapeake, VA 23041
 Pigeon Run, LLC, 1000 South Street, Suite 100, Chesapeake, VA 23041



Appendix 1

Attachment 14 a.



**Generation Interconnection
Feasibility Study Report
for
Queue Project AF2-404
GLADYS DP-STONEMILL 69 KV
0 MW Capacity / 0 MW Energy**

July 2020

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1 Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Dominion.

2 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

3 General

The Interconnection Customer (IC), has proposed adding a Storage generation to the AE2-185 solar and storage project located in Campbell County, Virginia. The request will not increase the facility output above the 60 MW of the AE2-185 project. The AF2-404 will be a 20 MW storage project. The proposed in-service date for this project is 12/15/2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-404
Project Name	GLADYS DP-STONEMILL 69 KV
State	Virginia
County	Campbell
Transmission Owner	Dominion
MFO	60
MWE	0
MWC	0
Fuel	Storage
Basecase Study Year	2023

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

4 Point of Interconnection

AF2-404 will interconnect with the Dominion transmission system as an uprate to AE2-185 which is a direct connection to the Gladys 69 kV substation.

5 Cost Summary

The AF2-404 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$ 0
Total System Network Upgrade Costs	\$ 0
Total Costs	\$ 0

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

6 Transmission Owner Scope of Work

Dominion assessed the impact of the proposed Queue Project AF2-404 was evaluated as a 0 MW Capacity (0 MW Energy) injection at the new AE2-185 230 kV substation in the Dominion Transmission System, for compliance with NERC Reliability Criteria on Dominion Transmission System. The system was assessed using the summer 2023 AF2 case provided to Dominion by PJM. When performing a generation analysis, Dominion's main analysis will be load flow study results under single contingency (both normal and stressed system conditions). Dominion Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of Dominion's Planning Criteria and interconnection requirements can be found in the Company's Facility Connection Requirements which are publicly available at: <http://www.dominionenergy.com>.

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically, in Planning Studies, NERC Planning Event 3 and 6 Contingency Conditions (Loss of generator, transmission circuit, transformer, shunt device, or Single Pole of a DC line followed by the loss of a generator, transmission circuit, transformer, shunt device or single pole of a DC line) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For Dominion Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

The required Attachment Facilities, Direct Connection and Non-Direct Connection work for the interconnection of the AF2-404 generation project to the Dominion Transmission System is detailed in the following sections. The associated one-line with the generation project attachment facilities and primary direct and non-direct connection are shown in Attachment 1.

Note that the ITO findings were made from a conceptual review of this project. A more detailed review of the connection facilities and their cost will be identified in a future study phases. Further note that the cost estimate data contained in this document should be considered high level estimates since it was produced without a detailed engineering review. The applicant will be responsible for the actual cost of construction. ITO herein reserves the right to return to any issues in this document and, upon appropriate justification, request additional monies to complete any reinforcements to the transmission systems.

The AF2-404 project will utilize the interconnection facilities being developed under the AE2-185 project.

Remote Terminal Work: During the Facilities Study, ITO's System Protection Engineering Department will review transmission line protection as well as anti-islanding required to accommodate the new generation and interconnection substation. System Protection Engineering will determine the minimal acceptable protection requirements to reliably interconnect the proposed generating facility with the transmission system. The

4. Compliance with the Dominion and PJM generator power factor and voltage control requirements.

The GSU(s) associated with the IC queue request shall meet the grounding requirements as noted in Dominion's "Dominion's Facility Interconnection Requirements" document located at:
<https://www.dominionenergy.com/company/moving-energy/electric-transmission-access>.

The IC will also be required to meet all PJM, SERC, and NERC reliability criteria and operating procedures for standards compliance. For example, the IC will need to properly locate and report the over and under voltage and over and under frequency system protection elements for its units as well as the submission of the generator model and protection data required to satisfy the PJM and SERC audits. Failure to comply with these requirements may result in a disconnection of service if the violation is found to compromise the reliability of the Dominion system.

9.3 Power Factor Requirements

The IC shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading (absorbing VARs) to 0.95 lagging (supplying VARs) measured at the high-side of the facility substation transformer(s) connected to the Dominion transmission system.

10 Revenue Metering and SCADA Requirements

10.1 PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

10.1.1 Meteorological Data Reporting Requirements

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Back Panel temperature (Fahrenheit)
- Irradiance (Watts/meter²)
- Ambient air temperature (Fahrenheit) – (Accepted, not required)
- Wind speed (meters/second) – (Accepted, not required)
- Wind direction (decimal degrees from true north) – (Accepted, not required)

10.2 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

<http://www.pjm.com/planning/design-engineering/to-tech-standards/>

11 Summer Peak - Load Flow Analysis

The Queue Project AF2-404 was evaluated as a 0.0 MW (Capacity 0.0 MW) injection and 20.0 MW battery load uprate to AE2-185 which is a direct connection to the Gladys 69 kV substation in the Dominion area. Project AF2-404 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-404 was studied with a commercial probability of 53%. Potential network impacts were as follows:

11.1 Generation Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

11.2 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

11.3 Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

None

11.4 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJE CT LOADIN G %	POST PROJE CT LOADIN G %	AC/D C	MW IMPAC T
95543328	242701	05LEESVI	138.0	AEP	314667	4ALTVST A	138.0	DVP	1	Base Case	operation	205.0	119.25	122.9	DC	7.49
95543329	242701	05LEESVI	138.0	AEP	314667	4ALTVST A	138.0	DVP	1	242549 OSBANST R 138 940080 AE1-250 TAP 138 1	operation	284.0	114.74	117.13	DC	6.78

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
95543330	242701	05LEESVI	138.0	AEP	314667	4ALTVESTA	138.0	DVP	1	AEP_P1-2_#5366-A	operation	284.0	114.74	117.13	DC	6.78
95976961	247499	05SMITHMTN2	138.0	AEP	242701	05LEESVI	138.0	AEP	1	Base Case	operation	205.0	99.83	103.48	DC	7.48
95976963	247499	05SMITHMTN2	138.0	AEP	242701	05LEESVI	138.0	AEP	1	24254905BANSTR138940080AE1-250TAP1381	operation	284.0	100.01	102.4	DC	6.78
97591000	314666	3ALTVESTA	115.0	DVP	314667	4ALTVESTA	138.0	DVP	1	DVP_P1-3:4ALTVESTA-TX#4	operation	126.524002075	104.35	108.41	DC	5.14

11.5 System Reinforcements

None

11.6 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

11.7 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

None

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
Base Case	
AEP_P1-2_#5366-A	CONTINGENCY 'AEP_P1-2_#5366-A' OPEN BRANCH FROM BUS 242549 TO BUS 940080 CKT 1 / 242549 05BANSTR 138 940080 AE1-250 TAP 138 1 OPEN BRANCH FROM BUS 242549 TO BUS 242632 CKT 1 / 242549 05BANSTR 138 242632 05EDAN 2 138 1 OPEN BRANCH FROM BUS 242549 TO BUS 314668 CKT Z1 / 242549 05BANSTR 138 314668 4BANISTR 138 Z1 END
DVP_P1-3: 4ALTVSTA-TX#4	CONTINGENCY 'DVP_P1-3: 4ALTVSTA-TX#4' OPEN BRANCH FROM BUS 314666 TO BUS 314667 CKT 2 /* 3ALTVSTA 115.00 - 4ALTVSTA 138.00 END
242549 05BANSTR 138 940080 AE1-250 TAP 138 1	CONTINGENCY '242549 05BANSTR 138 940080 AE1-250 TAP 138 1' OPEN BRANCH FROM BUS 242549 TO BUS 940080 CKT 1 END

12 Short Circuit Analysis

Short circuit analysis will be provided in the System Impact Study report.

13 Affected Systems

None

Attachment 1: One Line Diagram

