PLANNING BOARD
Z 08-21 Exhibits
September 27, 2021

EXHIBIT 6

Decommissioning Estimate

NC PE's credentials and experience

Chris Sandifer PE

3118 Green Road Spring Hope, NC 27882
919-632-6519

Site Decommissioning Report

1 September 2021

Site Identification

Name		Okra Holdings, LLC	
Size	Queue	**69 MW**	2018-06-26 15:18:00
Address		US Highway 52, Gold Hill, NC	
POI Coordinates		35°30'40.27"N 80°19'18.51"W	
County / State		Rowan NC	

Transmission Data

Owner/Operator		Duke Energy Carolinas	
Circuit Name		Albemarle 100 kV White	
Voltage	Type	100 kV	Network

Qualifications

The estimated costs herein are based on the author's 40 plus year's engineering experience and 30 plus years' electrical contracting experience in the design and construction of utility scale energy facilities.

Work Scope

This decommission plan is for the fenced 551+/- acres portion of a 574+/- acre tract for a proposed photovoltaic renewable energy generator known as Okra Solar. The project is located in Rowan County NC, is to be rated for 69 MW AC.

Not included: The cost of removal of any Duke owned facilities such as a ring bus switch, metering, power quality monitoring and control equipment is not included. Planting of trees, shrubs, and other woody vegetation (re-forestation) is not included. It is assumed that re-grading of the site to remove any erosion control improvements such as diversion dikes and retention ponds would not desirable. It is further assumed that the rocked internal paths would remain. The land use is currently in wood fiber production. This access enhancement feature would be highly advantageous to future timber harvest and would boost the stump prices to the property owners in the future.

Included in the removal cost: Buried and above ground power conductors, communications, control cables and conduits, concrete equipment pads, fencing, transformers, switch gear, inverters, piles, racks, tracking equipment, and panels. It is expected that the entire disturbed site will be limed and re-seeded with native grasses.

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Cost considerations

The cost estimates are based on employing a contractor with the experience and the ordinary equipment used in the deconstruction and decommissioning of PV solar farms or similar facilities. Cost estimates include current rates for the labor, materials, equipment depreciation, taxes, insurance, transport costs, equipment rental, overheads, and profit. Labor costs have been estimated using present day nonunion regional labor rates. There has been no future cost escalation or dollar deflation considerations. The equipment being decommissioned is assumed to be undamaged and in operating condition. The transformers, panels, solid state electronics and switch gear commonly have a 'used equipment' value significantly above scrap value in secondary after markets. Disassembly and removal of all other equipment is assumed to be performed without regard for any specific future material re-use except for recycled metals or landfill disposal. It is further assumed that there will be adequate material staging and laydown onsite for deconstruction, recyclables will transported to Charlotte, and the Rowan County Landfill will be used for wastes.

Cost breakdown table

	Qty	unit labor Cost $	Extended labor Cost $	tons	Freight Cost $	Land Fill Cost $	Total Restoration Cost $	unit salvage $/Lb	Extended salvage Cost $	Net Total $$
Item										
75 MVA transformer	1	$30K	$30,000	100	$3,389		$33,389	$2/kVA	$150,000	$116,611
Sungrow 3150U-MV	24	$900	$21,600	476	$4,233		$25,833	$4/kVA	$302,400	$276,567
2000 A 35kV bus 4 Lb./ft.	450	$2.5	$1,125	0.9	$8		$1,133	$3.38	$6,084	$4,951
35 kV Vacuum breakers	4	$800	$3,200	0.6	$5		$3,205	$2000/ea	$8,000	$4,795
100 kV circuit switcher	1	$3,000	$3,000	3.6	$32		$3,032	$5000/ea	$5,000	$1,968
200 kVAR shunt capacitors	75	$18	$1,350	2.1	$18		$1,368	$0.25	$1,031	-$337
Control panels	1	$200	$200	0.1	$1		$201	$600/ea	$600	$399
FTC Voyager tracker	1762	$325	$572,650	3172	$28,192		$600,842	$211/ton	$669,208	$68,366
tracking motor	1762	$13	$22,025	48	$423		$22,448	$0.25	$23,787	$1,339
racking harnesses (feet)	525000	$0.04	$18,375	9.5	$84		$18,459	$2.20	$41,580	$23,121
4/0 Cu 35 kV cable	47700	$0.35	$16,695	33.4	$297		$16,992	$1.10	$73,458	$56,466
PVC conduits	15900	$0.40	$6,360	15.9	$0	$572	$6,932	$0	$0	-$6,932
communications cable ft.	15900	$0.1	$954	0.8	$7		$961	$0.50	$795	-$166
fence 9 Gauge 1.75" mesh	25400	$0.45	$11,430	63	$562		$11,992	$188/ton	$11,890	-$102
concrete fence post/ 10ft	2540	$5	$12,700	64	$353	$2,286	$15,339	$0	$0	-$15,339
concrete pad 21' X 9 'X .5'	22	$300	$6,600	7	$39	$255	$6,895	$0	$0	-$6,895
Crush path 4" X 14'	0	$6/yd	$0	0	$0	$0	$0	$0	$0	$0
PV modules	172,718	$3/ea	$518,154	4430	$39,380		$557,534	$4/ea	$690,872	$133,338
Re-seeding (acre)	420	$120/acre	$50,400	0	$0		$50,400	$0	$0	-$50,400
Net Decommissioning is a Positive cash flow			$1,296,818		$77,023	$3,114	**$1,376,955**		$1,984,705	**$607,750**

This estimate is not based on a final project design. This estimate assumes the 551 acres can be effectively used for panel installation as shown on the site plan. Due to terrain, drainage, wetlands, access roads, additional setbacks and buffers, the actual number of panels installed

in any specific area is subject to change. The name and contact information for the manufacturer of the installed power generating panels has not been selected at this time. The panel manufacturer will be selected at a date closer to construction to ensure product availability and competitive pricing. The name and contact information for the company / contractor performing the installation will be identified after a final design and a complete set of construction plans are let for bids. The proposed schedule for synchronizing this project with the grid is the fourth quarter 2022 or the first quarter 2023. The panel currently under consideration for this project is the Jenko EAGLE 72HM G5b JKM515-535M-72HL4-TV-D2-US. Jenko has provided over 12 GW of panels to the US Market and a recognize leader in this industry. There is no copy of a manufacturer's recommendation for end of life management of equipment available. The primary and secondary contact information for the party responsible for management of installed equipment at the end of its useful life is unknown at this time. The Lessors have executed a Memorandum of Lease for their properties to be used for this project which the Lessee has duly recorded with the Register of Deeds in Rowan County.

The decommissioning costs herein are based on the following:

- FTC Voyager single axis trackers
- hydraulically installed racking piles – no concrete bases
- 550 W Jinko Eagle 72MH G5B panels
- copper conductors for the DC strings
- copper conductors for the low and medium voltage AC collector systems
- 4/0 copper MV cable for the 35 kV collection system
- Sungrow 3150U-MV inverters with integral GSU transformers
- 45/60/75 ONAN/ONAF/ONAF MVA rated Substation transformer
- six foot chain link fencing

Methods

All facilities will be considered to be de-energized with a visible means of "lock out – tag out" before removal. All the site facilities are assumed to be removed on the same mobilization and no part of the total facility will remain in operation. The inverters with transformers would be removed intact. The 75 MVA GSU transformer would be disassembled on site with the transformer fluid, radiators, bushings etc. contained and/or crated for reassembly. The other above ground and underground PV plant material will be mechanically disassembled in appropriate sizes for salvage and disposal, loaded and transported to their applicable destinations.

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This cost estimate was not based on detailed construction drawings but it would be typical for a project of this scope and type. Consequently the engineer accepts no liability for errors, omissions, or the adequacy as compared to the actual installed facilities. It is a violation of North Carolina State law for any person, unless acting under direction of a licensed professional engineer to alter this document.

Chris Sandifer PE

3118 Green Road Spring Hope, NC 27882
chrissandifer@embarqmail.com

1 September 2021

Ms. Rebecca Cheatham
Project Developer
Birdseye Renewable Energy
1125 E. Morehead St., Suite 202
Charlotte, NC 28204

Subject: Okra Holdings, LLC Health and Safety Report

Ms. Cheatham:

Okra Holdings, LLC proposes to construct a Utility Scale Solar Farm near the southern border of Rowan County, NC just east of US Highway 52 (Parcel Identification Number 6614-00-15-4655, 6614-00-13-4887, 6604-02-75-0947, 6604-02-77-2875, 6604-02-87-5727 and 6604-04-53-5618). I am familiar with the proposed type of equipment for this solar facility. I have studied the location and siting of this proposed project. I am familiar with the site plan for this project and its interconnection to the electrical grid. Please reference the Curricula Vitae that was sent separately to assess my unique qualifications to evaluate solar farms' health, safety and harmony. I have training and experience reviewing building codes as well as zoning and land use ordinances and regulations. My opinions with regard to issues related to solar farm equipment and design, solar farm locations, and solar farm safety impact have been accepted in judicial and quasi-judicial forums in the State of North Carolina, including municipal and county subdivisions of the State.

I have been employed in the solar industry for the past twelve (12) years, and I am familiar with the concepts of electrical engineering and design. I previously worked for Duke Energy and its predecessors in various roles, including interconnecting solar farms to the electric grid. My experience in the solar industry has taught me that solar farms are a practical solution to the need for sources of clean and renewable energy to power modern society.

I grew up on a farm in South Carolina and currently live on my own farm in Nash County, North Carolina. I also managed an additional 1,700 acres of family-owned, traditional farm lands in Lee, Nash, Edgecombe and Warren Counties in North Carolina. My family and I currently lease approximately 100 acres in Lee County, North Carolina for solar energy production (three 5 MW farms), on jointly owned property, with plans to expand the lease area. As an engineer, electrical contractor, farmer, and land owner, I have an abundance of tangible experience with solar farm design, construction, operation, and maintenance. Consequently, I understand the equipment, and procedures required for a safe and environmentally responsible installation and decommission and the subsequent removal of a solar farm's

facilities. I know that not only will the land not suffer detriment after the solar farm is removed but the soil will once again have the natural organisms which are vital to sustained organic crop production. I also appreciate the importance of having a steady and stable cash flow for a percentage of the annual farm business income.

I serve on the Nash County Planning Board. Nash County was one of the first counties in North Carolina to assess and approve photovoltaic solar farms. The Nash County Board of Commissioners has approved thirty-eight (38) utility-scale solar farms to date. The Board's experience with solar farms, as well as that of the Nash County Planning Department, has been very positive, and Nash County looks forward to more solar projects to benefit our community.

After construction is completed, the proposed Solar Farm will neither emit odor nor generate dust, as even common uses such as farming can. There is no permanent on-site parking or loading areas proposed, as this is an unmanned facility. Sound during full output operation of the Solar Farm will be indistinguishable from ambient background noise at the property boundary. The Solar Farm produces no noise at night.

The proposed Solar Farm will connect to and serve the existing power grid. Power distribution lines will be located underground except for interconnection of the facility to the power grid. Solar farms are safe, non-hazardous, unobtrusive, environmentally friendly, and advance the public necessity of adopting renewable sourcing of electricity. Because they are unpaved, they have beneficial stormwater and ground water recharging effects.

The proposed solar farm will consist of photovoltaic (PV) modules ("Panels") mounted on horizontal metal brackets that are attached to metal piles which are hydraulically pressed into the ground to minimize soil disturbance. The proposed solar panels do not contain any radioactive material, hazardous chemicals, or other material that could potentially cause harm to the surrounding community. The solar panels are non-combustible. They are safe and create no site emissions, odor, or dust. A solar facility is a low impact, passive use of the land. Solar farms enjoy widespread support from environmental organizations. Over 7,000,000 kW of solar generation are already connected to the grid in North Carolina. Solar technology like that proposed for the Property, is not new; solar panels have been in operation for more than fifty (50) years in the United States. The solar array may contain moving parts to enable the panels to track the sun's position in the sky. All electric components will have an Underwriters Laboratories (UL) listing and will comply with the edition of the National Electrical Code in effect at the time of construction.

From my education and experience, I know that EMF is present wherever electricity is present. For example, EMF is produced by magnets, electric tools, computers, radio and television transmitters, mobile phones, and medical devices. EMF is produced by a variety of natural sources as well as the production and distribution of electrical power. Ordinary household appliances such as televisions and refrigerators produce EMF. EMF strength attenuates rapidly as the distance from the source increases. PV panels produce weaker EMF than many household appliances, such as televisions and refrigerators.

The inverters (a solid state electronic device) used to convert electricity from direct current (DC) to alternating current (AC) power, will be located in the interior of the solar facility. Although the inverters inside the solar farm facility produce EMF, the strength of the fields decline rapidly with distance such that EMF measured at the perimeter of the physical facility is generally immeasurable when compared to background EMF.

Electricity is vital for our everyday lives and is essential for a growing economy. Aging traditional generation plants, such as coal and nuclear, will need to be shut down and replaced with new generation facilities. Solar farms are a public necessity in that they generate clean, inexpensive, and unlimited resource that should be preferred to conventional sources of power such as coal, gas, and nuclear energy. These conventional sources of electricity are expensive, use finite resources that require significant environmental disruption and public safety risks to extract and to utilize. This facility will not produce any by product waste such as coal ash or spent nuclear rods that could potentially endanger the environment.

Every NC utility scale solar project must receive a Certificate of Public Convenience and Necessity from the North Carolina Public Utilities Commission in order to make application to connect to the electric grid. Per the Solar Energy Industries Association, NC had over 7,000 MW of photovoltaic generation interconnected to the grid at the end of 2020. The costs for solar panels and electronic equipment continue to decrease as a result of mass production synergies. The output of solar panels has doubled in the last 10 years and the outputs are steadily rising due to improved technologies. The costs for utility scale energy storage are now also tracking down at the same rate and for the same causes. Duke Energy for example has retired 52 coal plants since 2010 and touts it has plans to reduce carbon emissions by 50% by the year 2030 and to be net-zero by 2050. This utility has found renewables to be a cost efficient solution for their new generation.

Approximately 40% of the US annual corn production is refined into ethanol. In 2018 the US Dept. of Energy reported 14.34 billion bushels of corn produced with 5.60 billion bushels used for ethanol fuel. At 165 bushels per acre that is 34 million acres of corn used for fuel. The ubiquitous solar panels installed in 2021 projects would produce that same net energy by using only 567 thousand acres. Photovoltaics are 60 times more efficient than photosynthesis derivatives.

The subject property adjacent to existing power transmission structures utilized to transmit power through the region. In order to effectively distribute electricity, the solar farm has to match the voltage of the line it is “tapping” into. Therefore, the electricity generated and transmitted by a solar farm does not increase the electrical voltage already present in the existing lines of the subject property and adjacent neighborhood, nor does it increase the current in the lines because it simply replaces current from other sources.

Solar farms make good transitional land uses in areas where suburban development is not envisioned in the immediate future. Solar farms, such as the one proposed, allow property owners to maintain large areas for future development while generating income from the

property. At the end of the useful life of the proposed Solar Farm, the land is easily redeveloped for home or other land uses or restored to farming.

Based upon the above stated facts and upon my experience as the engineer of record for multiple solar farms in North Carolina, and my review of this proposed Solar Farm, it is my professional opinion that:

- the proposed Solar Farm is appropriate.
- the proposed Solar Farm will not materially endanger the public health or safety, if located and installed according to the plan submitted and approved.
- the proposed Solar Farm will, if developed according to the plan as submitted and approved, will be in harmony with the area in which it will be located.
- the proposed Solar Farm is essential and desirable to the public convenience and welfare.
- the proposed Solar Farm will have adequate utilities, access roads, drainage, sanitation or other necessary facilities provided.
- the Proposed Solar Farm will, in all other respects, conform to the applicable regulations of the district in which it is located.

Please feel free to contact me, should you have any questions.

With Best Regards

Chris M. Sandifer PE

Chris Sandifer PE

CHRIS SANDIFER, PE

Spring Hope, NC 27882 ● 919.632.6519
chrissandifer@embarqmail.com

Registered and licensed professional Electrical Engineer with broad expertise in the design, building, maintenance and application of electrical power distribution systems since 1972. Extensive experience and proficiency in the redesign, repair, and rebuilding of large rotating electrical equipment and large power transformers. Developed and maintains a comprehensive knowledge of electrical and mechanical physics that enable a superior design. 30 years electric utility engineering experience.

Solar Experience

Engineering Consultant **2010 - 2021**

- Provide a total scope of medium and high voltage interconnection services for utility scale solar voltaic renewable energy developers including circuit design and equipment specifications.
- Vet potential solar farm sites for interconnection to the grid pursuant to the utility's compatibility requirements. The energy injection evaluations consider the size of the aggregate generation on the circuit, cumulative voltage drop, utility facility capacities, power flows, power factor, circuit stiffness factor and voltage flicker.
- Provide a budget cost for the required utility system upgrades.
- Provided preliminary solar site layouts, interconnection application technical data, and a single line diagram for each Interconnection package to the utility.
- Perform post mortem failure analyses for all types of renewable generator equipment including fluid filled transformers, switchgear and inverters.
- Provided expert testimony as to the 'health and safety' and the harmony in hundreds of hearings for zoning, CUPs & SUPs along the eastern seaboard.
- Registered professional engineer in SC, NC, FL, GA, VA, ID, MT, & TX.

Electrical Contractor **1999 - 2021**

A Licensed Electrical Contractor with the Unlimited Classification in NC since 1999. That business focus has been primarily the construction of medium and high voltage interconnections of utility scale renewable generators including photovoltaic, hydroelectric and landfill gas generators.

Education

Bachelor of Science, Electrical and Computer Engineering
Clemson University, Clemson, South Carolina

Farming

I grew up on a farm in SC and currently live on a farm in Nash County, NC. I currently lease approximately 100 acres for photovoltaic energy production The importance of having a steady and stable cash flow for a percentage of the farm income is appreciated.

Planning Board

I serve on the Nash County Planning Board. Nash County has approved 38 utility-scale solar farms to date. The Board's experience with solar farms, as well as that of the Nash County Planning Department staff, has been very positive, and we look forward to more solar projects to benefit our community.