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October 17, 2016

VIA ELECTRONIC FILING

Chief Clerk
North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, North Carolina 27699-4300

**Re: Application of Duke Energy Carolinas, LLC for a Certificate of Public Convenience and Necessity to Construct 21 MW Combined Heat and Power Facility at Duke University in Durham County, North Carolina
Docket No. E-7, Sub 1122**

Dear Chief Clerk:

Pursuant to North Carolina General Statutes ("N.C. Gen. Stat.") § 62-110.1 and Commission Rule R8-61, enclosed for filing is Duke Energy Carolinas, LLC's ("DEC") Application for a Certificate of Public Convenience and Necessity to construct a 21 megawatt combined heat and power facility at Duke University in Durham County, North Carolina, as well as supporting testimony. Pursuant to N.C. Gen. Stat. § 62-300(a)(5), DEC has submitted a check in the amount of \$250 to process this application.

Portions of the Application are being filed under seal and should be treated confidentially pursuant to N.C. Gen. Stat. § 132-1.2. Public disclosure of the information marked confidential would harm DEC's ability to negotiate favorable contracts because potential vendors would know the amounts DEC is willing to pay for products and services as well as the facility's forecasted operating costs.

Please let me know if you have any questions.

Sincerely,

Brian L. Franklin

Enclosures

cc: David R. Drooz (w/encls.)

OFFICIAL COPY

Oct 17 2016

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1122

In the Matter of Application of Duke Energy Carolinas, LLC For A Certificate of Public Convenience and Necessity to Construct a 21 MW Combined Heat and Power Facility at Duke University in Durham County, North Carolina)))))))	APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY TO CONSTRUCT A COMBINED HEAT AND POWER FACILITY
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Duke Energy Carolinas, LLC (“the Company” or “DEC”) hereby applies to the North Carolina Utilities Commission (“Commission”) pursuant to North Carolina General Statutes (“N.C. Gen. Stat.”) § 62-110.1 and Commission Rule R8-61 for a Certificate of Public Convenience and Necessity (“CPCN”) authorizing the construction and completion of a 21 megawatt (“MW”) Combined Heat and Power (“CHP”) facility (the “Facility”). The Facility will be owned by DEC and built in 2017 on an approximately 1-acre parcel (“Site”) leased from Duke University (“DU”) in Durham County, North Carolina. In support of its Application, DEC states as follows:

General Information

1. The Applicant’s general offices are located at 550 S. Tryon Street, Charlotte, North Carolina, and its mailing address is:

Duke Energy Carolinas, LLC
 P.O. Box 1321
 Charlotte, North Carolina 28201-1006

2. DEC is a public utility operating in North Carolina and South Carolina where it is engaged in the generation, transmission, distribution, and sale of electricity for compensation and is regulated by this Commission.

3. The names and addresses of Applicant’s attorneys are:

Brian L. Franklin
Associate General Counsel
Duke Energy Corporation
DEC45A/550 South Tryon St.
Charlotte, North Carolina 28202
Telephone: (980) 373-4465
Brian.Franklin@duke-energy.com

Dwight Allen
The Allen Law Offices
1514 Glenwood Avenue, Suite 200
Raleigh, North Carolina 27608
Telephone: (919) 838-0529
dallen@theallenlawoffices.com

Copies of all pleadings, testimony, orders, and correspondence in this proceeding should be served upon the attorneys listed above.

Project Overview

4. The Facility represents an opportunity for DEC to procure cost-effective base load generation and allows continuing diversification of the generation portfolio with distributed generation assets situated closer to electric customers. The Facility will generate electricity for DEC's grid and steam from waste heat for DU. For the reasons stated below, DEC respectfully requests that the Commission approve this CPCN application. DEC would appreciate the Commission's prompt consideration of this request.

The Facility

5. The Facility will be constructed as a CHP electric generation facility on land leased for 35 years from DU in Durham County, North Carolina, and will be situated on a single parcel totaling approximately 1 acre as shown in the vicinity map, Figure 1.

6. The Facility will consist of a combustion turbine generator (“CTG”) for electricity production and a heat recovery steam generator (“HRSG”) for steam production using waste heat from the CTG. The nominal generation capacity for the Facility will be approximately 21 MW electricity for DEC, 75,000 pounds per hour (“#/hr”) steam for DU, and 12,000 #/hr steam-equivalent for water heating for DU. The Facility is expected to operate at full load at all hours, with an annual capacity factor between 85 and 95%. The source of the Facility’s fuel will be natural gas from Public Service Company of North Carolina, Inc. (“PSNC”). Additional equipment to support the Facility will include building, stacks, fuel gas compressors, black-start capability, transformers, water/steam interconnections, meters, pumps, digital control system, circuit breakers, surge arrestors, conductors, junction boxes, a disconnect switch, connection cabling, and SCADA plant controllers. Figures 2 and 3 show the proposed site layout.

7. The Facility will interconnect to the adjacent 44kV Duke University Station #4 (“Station #4”), jointly owned by DEC and DU. For more information regarding the interconnection, see the single line drawing of the proposed interconnection, Figure 4.

8. The expected useful life of the equipment is 35 years. If the Commission approves this CPCN application, construction is anticipated to begin during 2017, with commercial operation beginning during the first or second quarter of 2019.

9. See Attachment 1 for NCUC Rule R8-61(b) required information.

Estimates of Initial and Ultimate Development

10. No development of the Site other than site studies are planned prior to CPCN approval. Additional generation capacity after project completion is not currently

planned. Should expansion be considered in the future, such plans would be the subject of a subsequent filing with the Commission.

Benefits of CHP

11. Combined Heat and Power technology provides the benefits of high efficiency distributed baseload gas generation to all DEC customers while simultaneously providing thermal energy solutions to commercial and industrial customers with steam host requirements. This integrated CHP approach of installing 10 to 30 MW-sized gas generation increments to the grid while also meeting customer steam host requirements provides a unique opportunity to collectively advance generation resource and customer energy planning. DEC recognized the benefits of CHP to cost effectively meet generation needs along with customer steam host requirements by including CHP as a capacity and energy resource in the 2016 DEC Integrated Resource Plan (“IRP”)

12. CHP uses a natural gas turbine to generate electricity and utilize the waste heat to provide steam to customers for heating, hot water, and other thermal process requirements. The process of combining gas turbine generation and waste heat steam production is similar to a combined cycle gas generation (“CC”) process (except that the direct utilization of the CHP waste heat from the gas turbine/HRSG is more efficient than a combined cycle steam turbine-generator resulting in approximately 60% of the waste heat recovered then being lost to the atmosphere). CHP technology creates a highly efficient and clean energy generation process with numerous advantages over larger, centrally located traditional generation, and provides distributed gas generation resources to the electric grid with shorter lead times and smaller 10 to 30 MW-generation increments to more closely match customer generation needs. CHP installations located

at customers' steam host sites have the advantage of reduced transmission and distribution ("T&D") losses, reduced T&D infrastructure costs, and improved energy reliability. Additionally, they are financially beneficial for steam host customers because DEC can sell steam from the turbine generator waste heat/HRSG process for less than the customer's ability to self-produce steam using a dedicated customer-owned gas boiler. With revenues from customer steam sales credited back to DEC electric customers, CHP is an attractive resource for cost effective distributed generation. .

13. Moreover, due to the continuous need for steam by the customer, CHP is designed to operate at high utilization rates or baseload operation mode that makes it available as a continuous reliable capacity resource. Since CHP produces both electricity and steam from a highly efficient process relying on a single fuel source and recaptured waste heat, CHP can achieve a total net carbon emission reduction by eliminating the separate generation of power and steam. Specifically, the DU CHP project is expected to reduce total CO₂ emissions by ~25-35% as compared to more traditional separate electricity and steam processes.

Project Justification

14. DEC began soliciting interest in CHP from existing large industrial, institutional, and military customers with high minimum steam needs in 2015, and identified DU as one of several interested prospects. CHP is financially beneficial to DU because the DEC CHP project can produce and sell steam for less than DU's ability to self-produce steam using a dedicated gas boiler. The Facility will be treated according to traditional rate making conventions as a regulated, rate-based generating asset owned by DEC.

15. DU desires to be a steam host for a DEC-owned CHP facility, and has been actively participating with DEC to execute contracts needed to define and support CHP at DU. DEC and DU are currently finalizing contracts. DU is also motivated by the energy security provided by the arrangement of electrical connections that would allow the Facility to operate in an “islanded” mode independent of DEC’s electric grid in the event of a wide-spread outage caused by a hurricane or similar event. The additional cost required to enable this capability will be borne by DU as an extra facilities charge or similar mechanism.

16. The Site consists of a single parcel of approximately 1 acre owned by DU and leased for 35 years to DEC in Durham County. The Point of Interconnection is in Station #4 across an access road, and no access, utility, or shade easements will be required from additional landowners. The parcel is wooded and will be cleared according to the final site plan. The land surrounding the parcel is used for DU utility and facilities functions, including Station #4, Chilled Water Plant #1, back-up diesel generator, vehicle and equipment storage garage, a student parking lot, and woodland. The parcel is currently zoned UC (i.e., University/College). There are no wetland and stream features and floodplain areas identified at the site. No critical habitat is expected to be present on the property. Additionally, no historic or cultural resources are likely to be in the project area. The project will interconnect at 44 kV Transmission.

17. The overall project economics of the Facility are favorable. Detailed IRP planning analysis using the most recently filed 2016 IRP base plan indicates that the DU CHP project is a cost competitive generation resource addition as compared to traditional generation. Since the Facility is the first of its kind on the DEC system, cost savings are

expected to be realized going forward with additional CHP installations due to increased procurement/installation/operational experiences. The total installed project cost is projected to be [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL], which as previously discussed, allows significant savings to be realized over the Facility's operational life from DU credited steam revenues.

18. The estimated cost of the Facility is approximately [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL], including transmission upgrades to tie into Station #4. DEC will be responsible for natural gas fuel cost and for operations and maintenance ("O&M") at the Facility, which will include staffing, continuous system monitoring, emergency response, maintenance, warranty management, spare parts inventory management, landscaping, performance reporting, and budgeting. The Company's estimate of reasonably anticipated annual non-fuel operating costs is [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL] (inclusive of labor, routine maintenance and anticipated major maintenance). Fuel cost is projected to be approximately [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL]. The land lease cost is expected to be a token amount. Additional costs for insurance and property tax will add an incremental annual cost of approximately [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL].

Agency Approvals

19. For information on agency approvals needed for the Facility, see the permit matrix, marked as Attachment 2.

Schedule for Construction, Testing, and Commercial Operation of the Facility

20. Should the Commission approve the CPCN request, construction, startup, commissioning, and performance testing of the Facility is anticipated to begin during the first quarter of 2017, with commercial operation beginning during the third quarter of 2018, assuming timely authorization to procure major equipment and obtaining necessary permits and approvals.

Impact of the Project on DEC's Overall Revenue Requirement

21. The impact of this project on DEC's overall revenue requirement will depend on both the timing in which the project is completed, and the timing of DEC's future general rate cases. In preparing the Company's next general rate case, if the project is not completed, the Company will determine whether or not to include the project's construction work-in-progress balance in its revenue requirements for purposes of setting proposed new rates, or to continue to accrue Allowance for Funds Used During Construction. Upon completion of the project DEC will incorporate the project cost into its revenue requirements in its next general rate case.

Engineer of Record, and Construction Contractor

22. Based on the analysis of complete bids, DEC has engaged Burns and MacDonnell as the Engineer of Record. DEC will solicit competitive bids for Construction Contractor and notify the Commission when awarded.

Equipment for the Project

23. Major equipment, including the CTG, HRSG, and generator step-up transformer, will be procured by DEC supply chain personnel. The CTG is the most critical equipment and drives project timing, engineering, and construction. DEC issued bid solicitations to qualified CTG vendors during the second quarter of 2016, with

execution of contracts pending internal and regulatory approvals. Balance of plant equipment will be procured by the Engineer and/or Construction Contractor.


Cost Recovery

24. DEC will request project capital and O&M cost recovery via the traditional base rate making process in the next general rate case. Fuel cost recovery will occur through the fuel clause per N.C. Gen. Stat. § 62-133.2. In addition, per N.C. Gen. Stat. § 62-133.2, revenue from DU's payment for steam and water heating will be credited to the fuel clause as a net gain or loss resulting from the sale of a by-product.

WHEREFORE, Duke Energy Carolinas, LLC respectfully requests that the North Carolina Utilities Commission approve this Application for a Certificate of Public Convenience and Necessity pursuant to N.C. Gen. Stat. § 62-110.1 and Commission Rule R8-61 for the construction of a 21 MW Combined Heat and Power project located on land leased by DU to DEC in Durham County, North Carolina and for such other relief as the Commission deems just and proper.

Respectfully submitted, this the 17th day of October, 2016.

DUKE ENERGY CAROLINAS, LLC

By: 
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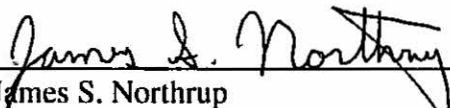
Dwight Allen
The Allen Law Offices
1514 Glenwood Avenue, Suite 200
Raleigh, North Carolina 27608
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dallen@theallenlawoffices.com

ATTORNEYS FOR DUKE ENERGY
CAROLINAS, LLC

VERIFICATION

STATE OF NORTH CAROLINA)	
)	DOCKET NO. E-7, SUB 1122
COUNTY OF MECKLENBURG)	

PERSONALLY APPEARED before me, James S. Northrup, after first being duly sworn, said that he is Director, Wholesale and Renewables Analytics for Duke Energy Business Services, LLC, and as such is authorized to make this verification; that he has read the foregoing *Application for a Certificate of Public Convenience and Necessity* and knows the contents thereof; and that the same are true and correct to the best of his knowledge, information, and belief.



 James S. Northrup
 Director, Wholesale and Renewables
 Analytics
 Duke Energy Business Services, LLC

Sworn to and subscribed before me this 17 day of October, 2016.



 Notary Public

My Commission expires: 7-30-17



Figure 1: Vicinity Map

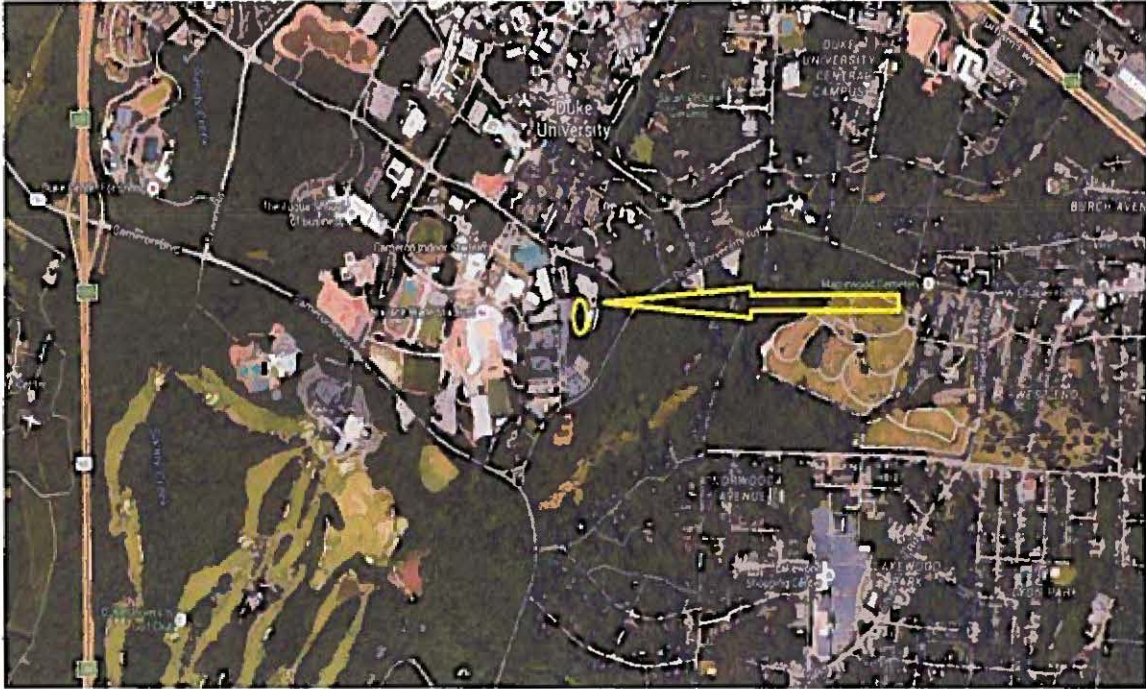


Figure 2: Preliminary Site Layout



Figure 3: Preliminary Equipment Layout

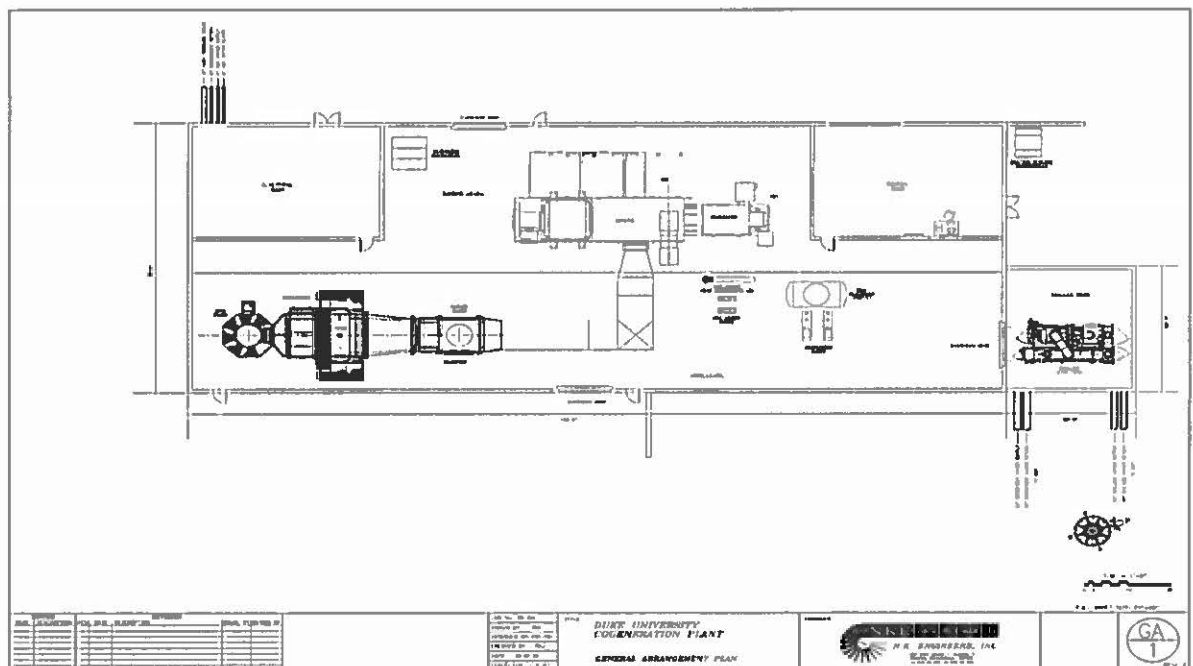
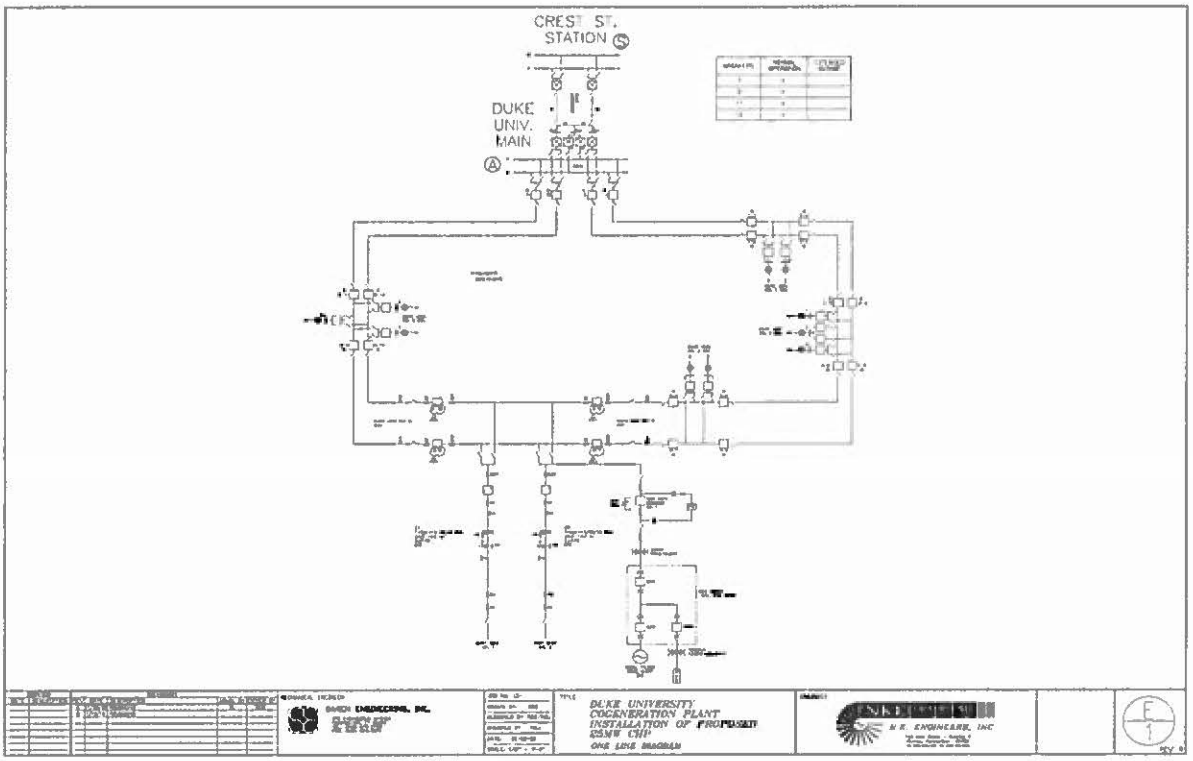


Figure 4: Single-Line Drawing



Attachment I

NCUC Rule R8-61(b) Required Information

Preliminary Information Concerning Geological, Aesthetic, Ecological, Meteorological, Seismic, Water Supply, Population and General Load Center Data

Geological

A review of a North Carolina Geological Survey report indicates that the site ("Site") for the Duke University ("DU" combined heat and power ("CHP") facility (collectively, the "Facility") lies in the northeast to southwest trending Triassic Durham Basin and is underlain by the Chatham Group Formation (TRc) (NCGS, 1989). The Chatham Group consists of sedimentary rocks that include conglomerate, fanglomerate, sandstone and mudstone. Specifically within the site area, bedrock consists of sandstone interbedded with siltstone (TRcs/sil). Jurassic intrusive diabase dikes may also be present locally. These dikes are typically dark-gray to black and are fine to medium-grained in appearance.

Soil Characteristics

The U.S. Department of Agriculture's ("USDA") online Web Soil Survey map (last modified on 12/06/2013) was reviewed to identify soil characteristics that may be encountered onsite. The site area consists of two main units: 1.) White Store sandy loam (WsE), or 2.) Urban Land (Ur). White Store sandy loam is present on hillslopes, and is moderately well drained. It consists of sandy loam in the upper six inches which is underlain by 6 to 35 inches of clay, then 35 to 53 inches of clay loam. Weathered bedrock is encountered below the clay loam horizon. Urban land consists of paved areas or areas of highly disturbed soil related to human activity.

Aesthetic

The Facility site will not create significantly different visual impacts for adjoining properties or passersby. The Facility will be located next to other utility operations which support DU and the Site will be designed and constructed in accordance with architectural guidelines implemented by DU. The Site layout shows a 5-foot setback surrounding the entire site. Additionally, DEC will utilize a landscaping plan based on Best Management Practices, experience at other power generation sites across the state, and in accordance with DU guidelines. The maximum height of the building will be 25 feet when viewed from the west side facing the parking lot. A screening wall facing the parking lot will hide equipment located on the roof. There will be one or two exhaust stacks rising up to 30 feet above the roof.

Ecological

Protected Species

Duke Energy has reviewed information obtained from the United States Fish and Wildlife Service ("USFWS") and the North Carolina Natural Heritage Program

("NCNHP") databases to determine if the subject site may affect listed threatened or endangered species or designated critical habitats. Based on the information reviewed, the following species are listed as Protected, Threatened or Endangered in Durham County:

- The Bald Eagle (*Haliaeetus leucocephalus*) has been observed within Durham County and is protected by the Bald and Golden Eagle Protection Act. There are no known bald eagle nests in the vicinity of DU and the Site. There is also no likely foraging habitat at the proposed Site. In Durham County, there are 15 known nests adjacent to Falls Lake and 14 nests adjacent to B. Everett Jordan Lake.
- Michaux's Sumac (*Rhus michauxii*) has been documented in Durham County and is listed as federally endangered. Michaux's sumac grows in sandy or rocky open woods in association with basic soils. This plant survives best in areas where some form of disturbance has provided an open area. Several populations in North Carolina are on highway rights-of way, roadsides, or on the edges of artificially maintained clearings. There are no known populations within or adjacent to the proposed Site. The nearest population is approximately 20 miles to the north (i.e., near the Durham/Person County line) of the Site in the vicinity of the Flat River. In addition, the Site is considered to be developed in nature and within an urban setting. Therefore, the proposed project is not expected to impact this species.
- Smooth Coneflower (*Echinacea laevigata*) has also been documented in Durham County and is listed as federally endangered. Smooth coneflower, in North Carolina, is typically found in open woods, glades, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium and calcium rich soils associated with gabbro, and diabase. Smooth coneflower occurs in plant communities that have been described as xeric hardpan forests, diabase glades or dolomite woodlands. Optimal sites are characterized by abundant sunlight and little competition in the herbaceous layer. There are no known populations within or adjacent to the proposed Site. The nearest population is located more than six miles to the northeast of the Site (i.e., diabase glade) and near Falls Lake. In addition, the proposed Site is considered to be developed in nature and within an urban setting. Therefore, the Facility is not expected to impact this species.
- There are no conservation easements, USFWS lands, USFWS critical habitats, or state owned lands within or immediately adjacent to the proposed Site.

Meteorological

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Monthly Climatological Summary (2015)

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Elev: 416 ft, Lat: 35.892° N, Lon: 78.782° W

Generated on 03/14/2016

Station: RALEIGH DURHAM INTERNATIONAL AIRPORT, NC US GHCND USW00013722

Date	Temperature (F)								Precipitation (in.)									
	EMN	MMN	MNTM	HTDD	CLDD	EMXT	EMNT	DT90	DT32	DT32	DT00	TOTPCP	EMXP	TSNW	MXSD	DP01	DP05	DP10
	Mean Min.	Mean Min.	Mean	Heating Degree Days	Cooling Degree Days	Highest	Lowest	Number Of Days				Total	Greatest Observed	Snow, Sleet, Hail	Number Of Days			
Month	Mean Max.	Mean Min.	Mean	Heating Degree Days	Cooling Degree Days	Highest	Lowest	Max<=90	Max<=32	Min<=32	Min<=0	Total	Greatest Observed	Total Fall	Max Depth	<= .10	<= .50	>= 1.0
1	49.8	30.2	38.9	778.0	0.0	69	11	0	1	21	0	3.36	1.29	0.0	0	7	2	1
2	45.0	24.8	34.9	841.7	0.0	72	7	0	5	24	0	2.91	0.72	7.9	4	7	1	0
3	62.8	39.7	51.3	427.3	3.8	82	26	0	0	8	0	3.28	0.97	0.0	1	9	2	0
4	72.5	50.3	61.5	192.5	60.2	84	33	0	0	0	0	5.28	1.23	0.0	0	9	3	1
5	82.2	59.3	71.1	20.5	210.8	91	48	2	0	9	0	3.04	1.38	0.0	0	7	2	1
6	90.1	68.4	79.3	0.9	430.4	100	59	16	0	0	0	6.38	2.10	0.0	0	9	4	2
7	89.2	70.7	80.1	0.0	468.0	94	64	16	0	0	0	5.01	1.57	0.0	0	7	6	1
8	88.3	67.6	77.9	0.0	403.0	87	60	11	0	0	0	4.82	1.75	0.0	0	5	3	2
9	82.9	64.4	73.6	2.0	260.1	94	48	5	0	0	0	4.81	1.42	0.0	0	9	3	2
10	71.1	49.8	60.4	162.7	22.3	83	32	0	0	1	0	5.06	2.07	0.0	0	8	2	2
11	63.5	45.3	55.4	294.7	9.3	77	27	0	0	5	0	7.14	1.86	0.0	0	9	6	3
12	65.1	47.1	56.1	300.1	25.4	77	26	0	0	4	0	6.07	1.79	0.0	0	8	4	2
Summary	72.0	51.5	61.8	2979.8	1681.3	100	0	32	6	61	0	87.19	2.10	7.9	4	94	39	17

Seismic

There are no known faults onsite, or in the direct vicinity of the Site, based on a review of USGS geologic data for North Carolina. The area is in a relatively low risk zone for earthquakes according to the USGS Seismic Hazard map for North Carolina. Although no faults have been mapped on the Site, faults may still exist. The clearest identified faulting is roughly 16 miles away along the southeastern edge of the Durham basin where down-faulting occurs forming the half-graben structure of the basin (NCGS, 1989).

Water Supply

Water usage will be minimal during construction of the Facility. Water will be used for fugitive dust control during construction on an as-needed basis. Water will also be used for make-up purposes to support the generation of steam from the heat recovery steam generator. Water is supplied from the City of Durham and a portion of the condensate will be returned from DU.

Population

The Facility will be located in Durham County, North Carolina (2013 est. population 288,133).

Load Center Data

The Facility will help serve the Durham County and DU population and its continuing growth, and will help lower demand for non-renewable generation to be imported to the region.

Investigations Required to Support the Project

Probable Visual Effect Analysis

The Facility project area encompasses one parcel totaling approximately one acre owned to be leased to Duke Energy from DU. The Point of Interconnection is on site and no access, utility or shade easements will be required of additional landowners. The primary land use of the parcels is urban development in a university campus setting some clearing may be necessary depending on final site plan. Land use in the project vicinity is wooded land, institutional, and residential. The Site will have a 5-foot setback surrounding the entire site.

Noise

Noise from the Facility after construction will be minimal. There is a buffer between the Facility and the residential areas and the general public should not be impacted by any noise emanating from the site.

Although a buffer exists, there nevertheless will be construction noise from the Facility. Any disturbance would occur principally during daylight hours as a result of heavy equipment operation and general construction vehicle traffic.

Wetlands and Waters of the U.S.

Duke Energy conducted a desktop assessment of jurisdictional waters of the U.S., including wetlands. During this wetland determination, Duke Energy evaluated potential jurisdictional waters of the U.S. based on information from the desktop review of the USFWS National Wetland Inventory maps and site specific knowledge. No wetlands or Waters of the U.S. were identified within or immediately adjacent to the Site. The nearest waterbody (i.e., unnamed tributary to Sandy Creek) is approximately 800 feet to the southeast of the proposed Site and Duke University Road. In addition, the Site is considered to be developed in nature and within an urban setting. Therefore, the proposed project is not expected to impact wetlands or Waters of the U.S.

Floodplain

Based on a review of Federal Emergency Management Agency ("FEMA") floodplain maps, there are no areas of the proposed project within the 100-year floodplain. The nearest designated 100-year floodplain (Zone AE) is approximately 760 feet southeast of the proposed Site and associated with an unnamed tributary of Sandy Creek (i.e., Flood Insurance Rate Map Panel 0811). This designated floodplain is also southeast of Duke University Road.

Cultural Resources

Duke Energy reviewed information obtained from the North Carolina Historic Preservation Office ("NCSHPO") to determine if the subject site contained historic properties (i.e., HPOWEB GIS database). Based on the information reviewed, historic properties, historic districts, and other cultural sites are not represented within the

proposed Site boundaries. The Historic District DH1778 (i.e., Duke University West Campus Historic District) is located approximately 400 feet east and 1,154 feet north of the proposed Site (west and north of Wannamaker Drive).

Protected Areas

There are no protected lands associated with this proposed Site. Thus, protected lands are not anticipated to impact schedule or cost of the project.

Other Development at the Site

At this time, beyond the Facility, there are no known plans to develop the property identified for the Facility.

Water Quality

Given the nature of the Facility, no impact to water quality of nearby streams or wetlands is anticipated from the Facility. Potential construction-related impacts are most closely associated with the possibility for erosion and runoff from land disturbances within the Site, although the Facility will mitigate such impacts through the storm water best management practices described below. Once ongoing operation of the Facility is established, the site will fall under the Stormwater Management Plan implemented by DU.

Spill Prevention, Containment, and Countermeasure ("SPCC") Plan

An SPCC Plan will be required if 1,320 or more gallons of oil are stored above ground on site (this includes fuel storage and transformers) during construction and/or operations. This plan must be completed prior to storing 1,320 gallons or more of oil onto the site.

Erosion and Sedimentation Control ("E&SC") Plan

An E&SC Plan will be developed for the site and approved by the North Carolina DEMLR prior to the start of land disturbing activities.

Construction Storm water Permit

Conditions of the general permit will be verified, including completion of the E&SC Plan. Once the E&SC Plan is approved by the North Carolina Division of Energy, Mineral, and Land Resources ("DEMLR"), coverage under this general permit is automatic and no Notice of Intent is required.

Post-Construction Storm water Permit

The Facility will have interconnections with the university's stormwater and wastewater systems. The university currently holds an individual stormwater permit and releases from Facility will be covered under their permit, which includes both local and regional Best Management Practices ("BMPs") for managing the flow.

E&SC and Storm water Plan Review

Prior to the submittal of the E&SC Plan as well as the Construction and Post-Construction Storm water plans to the DEMLR, they must be reviewed and approved by Durham County. The ground stabilization and basin design requirements for the stormwater permit must be included in the E&SC Plan. The plan may require approval by Durham County.

Spill Response Plan

A Spill Response Plan is required for the project. The Spill Response Plan will include a list of reporting channels, telephone numbers, a listing of the hazardous materials stored on site, copies of Material Safety Data Sheets for the hazardous materials, and a Site diagram outlining where the storage sites are located.

Air Quality

National Ambient Air Quality Standards have been established by the U.S. Environmental Protection Agency ("EPA") and adopted by the N.C. Department of Environment and Natural Resources. These standards, contained in Chapter 15A of the North Carolina Administrative Code, Subchapter 2D (Air Pollution Control Requirements), Section .0400, establish certain maximum limits on parameters of air quality considered necessary for the preservation and enhancement of the state's air resources.

The proposed operations will be permitted as an independent facility and will hold an air permit separate from DU. Potential emissions from the equipment indicate that the Facility will be permitted as a "small" facility. This classification means that Prevention of Significant Deterioration ("PSD") permitting is not triggered and the turbine will not be required to install Best Available Control Technology. Continuous Emissions Monitoring Systems will be utilized on the bypass and HRSG stacks to ensure compliance with the New Source Performance Standards ("NSPS"). Because of their size, the units will be exempt from the Acid Rain and Cross State Air Pollution trading program requirements.

The primary emission limit for the turbines is from the NSPS regulation. Emission limits for the turbines include the following:

- 25 ppm NO_x corrected to 15% O₂, when operating greater than 75% capacity. 150 ppm NO_x corrected to 15% O₂ when operating less than 75% of peak load.
- SO₂ emissions are restricted to 0.060 lb per Million British Thermal Units, which should be easily achievable firing natural gas.

During the construction phase, the Facility may be subject to air permitting requirements depending on the type of equipment used (such as portable generators) and the associated level of air emissions. The primary air quality issue during construction will be dust from non-point sources, such as earthwork and construction traffic on unpaved roads. This type of dust is described as fugitive dust. Water trucks will be used

to suppress dust as required. Blasting operations are not anticipated. Fugitive dust impact is expected to be equivalent to a normal construction project of this magnitude.

Other potential sources of pollutants during construction are mobile internal combustion engines (e.g., earth moving equipment, cranes, etc.), temporary sources (e.g., portable generators and air compressors), and increased vehicle traffic by construction workers. Emissions from these sources should have little impact. Any emissions from sources during construction will be addressed through the North Carolina Division of Air Quality air quality permit application process.

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Attachment 2

Permitting Matrix

Task Name	Regulatory Agency	Status
Federal		
<i>Waters and Wetlands</i>		
Preliminary stream and wetland determination investigation	USACE	Complete
Wetland/stream delineation and isolated waters/upland ditches evaluation.	USACE	Complete
Formal USACE Jurisdictional Determination based on wetland delineation	USACE	Will be conducted if needed. Not anticipated based on desktop reviews.
<i>Wildlife</i>		
Informal Consultation with USFWS	USFWS	Will be conducted if needed. Not anticipated based on desktop reviews.
<i>Stormwater and Water Quality</i>		
SPCC Plan: Construction	EPA	EPC Contractor to complete once selected.
Stormwater Permit: Construction	EPA	EPC Contractor to complete once selected.
Stormwater Pollution Prevention Plan: Construction	EPA	EPC Contractor to complete once selected.
<i>Other</i>		
FAA Determination	FAA	Not anticipated to be required. Will confirm once final design is developed.
North Carolina		
Erosion and Sedimentation Control Plan	DEMLR / Durham County	EPC Contractor to complete once selected.
Construction Stormwater Permit - Notice of Intent	DEMLR / Durham County	EPC Contractor to complete once selected.
Post-Construction Stormwater Permit	DEMLR / Durham County/ City of Durham	EPC Contractor to complete once selected.
Oversize/Overweight	DOT	EPC Contractor
NC Utilities Commission Filings	NCUC	Q2 2016
Air Permit Application	DAQ	Anticipate submittal Q2 2016.

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1122

In the Matter of)	
Application of Duke Energy Carolinas, LLC)	DIRECT TESTIMONY OF
For A Certificate of Public Convenience and)	JAMES S. NORTHRUP FOR
Necessity to Construct a 21MW Combined)	DUKE ENERGY CAROLINAS, LLC
Heat and Power Facility at Duke University)	
in Durham County, North Carolina)	

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

2 A. My name is James S. Northrup and my business address is 400 South Tryon
3 Street, Charlotte, North Carolina 28202.

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

5 A. I am employed as Director, Wholesale and Renewables Analytics by Duke
6 Energy Business Services LLC. Duke Energy Business Services LLC is a
7 service company affiliate of Duke Energy Carolinas, LLC ("Duke Energy
8 Carolinas," "DEC", or "Company"). Duke Energy Carolinas, LLC is a
9 wholly owned, indirect subsidiary of Duke Energy Corporation ("Duke
10 Energy").

11 **Q. WHAT ARE YOUR RESPONSIBILITIES AS DIRECTOR,
12 WHOLESALE AND RENEWABLES ANALYTICS?**

13 A. As Director, Wholesale & Renewables Analytics, I am responsible for
14 developing specific strategies for Duke Energy's regulated utilities, including
15 commercial support for Requests For Proposals ("RFPs") for renewable and
16 supply side resources and major project/initiative business case analysis.

17 **Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL
18 BACKGROUND.**

19 A. I am a registered professional engineer in the state of North Carolina, having
20 received a Bachelor of Science in Civil Engineering from North Carolina
21 State University and a Master's Degree in Business Administration from
22 Queens University. I began my career at Duke Power Company in 1979 and
23 have held a variety of responsibilities across Duke Energy in the areas of

1 electric system distribution engineering, customer marketing, Demand-Side
2 Management Program design and implementation, generation business
3 planning, generation expansion planning, energy risk management, and
4 Integrated Resource Planning. After coordinating the development of
5 Demand-Side Customer Programs, I joined the Generation System Planning
6 Group in 1994 and coordinated the development of the Integrated Resource
7 Plan (“IRP”) filings for state regulatory agencies. I was promoted to
8 Manager, Generation Business Support in the Power Generation Group in
9 2000 to lead the business case development and asset strategy for fossil/hydro
10 generation. In 2003, I was promoted to Director, System and Power Planning
11 Group to guide major investments for generation assets and develop
12 expansion plans to maintain system reliability. In 2006, I was promoted to
13 Director, Regulated Economic Analysis where I worked in Integrated
14 Resource Planning, new generation investments, and maintaining system
15 reliability. In July 2012, I was promoted to my current position as Director,
16 Wholesale and Renewables Analytics.

17 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE NORTH**
18 **CAROLINA UTILITIES COMMISSION?**

19 A. No, but I have submitted testimony in various dockets before this
20 Commission, including Docket No. E-2, Sub 1063, which concerned Duke
21 Energy Progress, LLC’s Application for a CPCN for a 12.8 megawatt
22 (“MW”) solar facility at Marine Corps Base Camp Lejeune in Onslow
23 County, North Carolina, as well as Docket No. E-7, Sub 1101, which

1 concerned DEC's Application for a CPCN for a 6 MW solar facility in Rowan
2 County, North Carolina.

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

4 A. The purpose of my testimony in this proceeding is to support DEC's
5 Application for a Certificate of Public Convenience and Necessity to construct
6 a 21 MW combined heat and power ("CHP") generating facility ("Facility") at
7 Duke University ("DU") in Durham County, North Carolina.

8 **Q. WERE YOU INVOLVED IN PREPARING DEC'S APPLICATION IN
9 THIS DOCKET?**

10 A. Yes.

11 **Q. TO YOUR KNOWLEDGE, HAS DEC FILED AND PROVIDED ALL
12 INFORMATION, BEGUN PUBLIC NOTICE REQUIRED BY THIS
13 COMMISSION, AND OBTAINED ALL FEDERAL AND STATE
14 LICENSES, PERMITS, AND EXEMPTIONS REQUIRED FOR
15 CONSTRUCTION AND OPERATION OF THIS PROPOSED
16 GENERATION FACILITY?**

17 A. Yes.

18 **Q. WHY IS DEC REQUESTING THIS COMMISSION TO GRANT THE
19 CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY?**

20 A. As detailed in the Certificate application, upon approval from the
21 Commission, the Facility will be constructed as a CHP electric generation
22 facility on land leased for 35 years from DU in Durham County, North

1 Carolina, and will be situated on a single parcel totaling approximately one
2 acre.

3 CHP technology represents a unique opportunity to provide the
4 benefits of high efficiency distributed baseload gas generation to all DEC
5 customers while simultaneously providing thermal energy solutions to
6 commercial and industrial customers with steam host requirements. This
7 integrated CHP approach of installing 10 to 30 MW-sized gas generation
8 increments to the grid while also meeting customer steam host requirements
9 provides a unique opportunity to advance generation resource and customer
10 energy planning. DEC recognized the benefits of CHP to cost effectively
11 meet generation needs along with customer steam host requirements by
12 including CHP as a capacity and energy resource in the 2016 DEC IRP.

13 CHP installations located at customers' steam host sites have the
14 advantage of reduced transmission and distribution ("T&D") losses, reduced
15 T&D infrastructure costs, and improved energy reliability. Additionally, they
16 are financially beneficial for steam host customers because DEC can sell
17 steam from the turbine generator waste heat/heat recovery steam generator
18 process for less than the customer's ability to self-produce steam using a
19 dedicated customer owned gas boiler. With revenues from customer steam
20 sales credited back to DEC electric customers, CHP is an attractive resource
21 for cost effective distributed generation.

22 DEC began soliciting interest in CHP from existing large industrial,
23 institutional, and military customers with high minimum steam needs in 2015,

1 and identified DU as one of several interested prospects. CHP is financially
2 beneficial to DU because the DEC CHP project can produce and sell steam for
3 less than DU's ability to self-produce steam using a dedicated gas boiler. The
4 Facility will be treated according to traditional rate making conventions as a
5 regulated, rate-based generating asset owned by DEC

6 DU desires to be a steam host for a DEC-owned CHP facility, and has
7 been actively participating with DEC to execute contracts needed to define
8 and support CHP at DU. DEC and DU are currently finalizing contracts. DU
9 is also motivated by the energy security provided by the arrangement of
10 electrical connections that would allow the Facility to operate in an "islanded"
11 mode independent of DEC's electric grid in the event of a wide-spread outage
12 such as caused by a hurricane or similar event. The additional cost required to
13 enable this capability will be borne by DU as an extra facilities charge or
14 similar mechanism. Additionally, the DU CHP project is expected to reduce
15 total CO2 emissions by ~25-35% as compared to more traditional separate
16 electricity and steam processes.

17 The overall project economics of the Facility are favorable. Detailed
18 IRP planning analysis using the most recently filed 2016 IRP base plan
19 indicates that the Duke University CHP project is a cost competitive
20 generation resource addition as compared to traditional generation. Since the
21 Duke University CHP is the first of its kind on the DEC system, cost savings
22 are expected to be realized going forward with additional CHP installations
23 due to increased procurement/installation/operational experiences.

- 1 Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?
- 2 A. Yes.