ELECTRONICALLY FILED - 2022 May 16 5:13 PM - SCPSC - ND ND-2022-4-E - Page 1 of 9

A Carbon Baseline and Accounting

The North Carolina Utilities Commission's ("Commission" or "NCUC") Carbon Plan Procedural Order required that the Companies' Carbon Plan address the following:

- The methodology used to determine the baseline 2005 level of carbon dioxide ("CO_2") emitted in the State by their electric generating facilities;
- The methodology used to calculate the reduction in CO_2 emitted from their electric generating facilities; and
- The methodology used to quantify the reduction associated with any offset proposed and the methodology for verifying any such offset.[1]

This Appendix provides the background information and details responsive to the Commission's request. The Companies request the Commission find that the methodologies outlined for calculation of the baseline and compliance with Session Law 2021-165 ("HB 951") CO_2 emissions reductions targets are reasonable and appropriate for tracking the Companies' progress.

Foundational Carbon Accounting Principles

Based on a detailed review of HB 951, the Companies have set the following foundational principles for CO_2 emissions reductions accounting that will be utilized to determine compliance with the mandated targets.

- **CO_2 Emissions – not Greenhouse Gas ("GHG") Emissions:** HB 951 defines the scope of the carbon reduction target is CO_2 emissions only, not a broader definition of GHG emissions, which would include nitrous oxide, methane, etc.
- **Emissions from Electric Generation Facilities Only:** Additionally, HB 951 defines the boundary of the emissions source as CO_2 emissions from electric generation facilities owned,

[1] *Order Requiring Filing of Carbon Plan and Establishing Procedural Deadlines*, Dkt. No. E-100, Sub 179, at 3 (Nov. 19, 2021) ("Carbon Plan Procedural Order").

ELECTRONICALLY FILED - 2022 May 16 5:13 PM - SCPSC - ND ND-2022-4-E - Page 2 of 9

operated by, or operated on behalf of, the Companies. Note that CO_2 emissions from auxiliary units such as backup generators, fire pumps, etc. are not included as part of the accounting.

- **Geographic Boundary:** HB 951 only applies to CO_2 emissions from electric generation facilities located within the State of North Carolina. Therefore, subject to further guidance from the Commission, CO_2 emissions resulting from energy generated out of State and imported into the State, whether owned by the Companies or not, are not accounted for in the baseline or compliance calculations. Conversely, energy generated by in-State electric generation facilities but sold out of State is not removed. Further discussion of safeguards that have been put into place in the Pathways modeling to ensure that portfolios do not result in emissions leakage is in the section "Consideration of the Geographic Boundary" in this Appendix.

- **Direct Emissions not Upstream Emissions of the Fuel Supply:** Given HB 951's focus on emissions generated within the geographic boundary of the State, the Companies are proposing to focus compliance on direct emissions from electric generation facilities. Stakeholders voiced significant interest in including upstream emissions related to the fuel supply (e.g., methane emissions) in the Plan targets. The Companies want to be clear that while the recommendation is to focus compliance on direct emissions from electric generation facilities, upstream emissions related to fuel supply are captured in other Duke Energy sustainability commitments, including the expansion of companywide carbon neutrality targets to include Scope 2 and certain Scope 3 emissions as announced in February 2022.[2]

Methodology to Determine the 2005 Baseline CO_2 Emissions

HB 951 directed the Commission to approve a Plan that, "shall take all reasonable steps to achieve a 70% reduction in emissions of CO_2 emitted in the State from electric generation facilities owned or operated by electric public utilities from 2005 levels by the year 2030 and carbon neutrality by the year 2050."[3] The legislation prescribes the use of 2005 as the baseline year against which to measure emission reductions. 2005 is a commonly used baseline year for CO_2 emissions reductions targets, including the U.S. nationally determined contribution for the Paris Agreement submitted in 2021[4] and the Clean Energy Plan developed by the North Carolina Department of Environmental Quality.

The CO_2 emissions regulated under HB 951 fall into three categories, including emissions from electric generation facilities: (1) owned by the electric power utility, (2) operated by the electric power utility and (3) operated on behalf of the electric power utility. Detailed definitions for each of these CO_2 emissions categories are provided in Table A-1 below. As discussed in the Carbon Plan Stakeholder

[2] Duke Energy News Center, Duke Energy expands clear energy action plan (Feb. 9, 2022), *available at* news.duke-energy.com/releases/duke-energy-expands-clean-energy-action-plan.

[3] H.B. 951, Part I, Section 1.

[4] Fact Sheet, President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies, April 22, 2021.

ELECTRONICALLY FILED - 2022 May 16 5:13 PM - SCPSC - ND ND-2022-4-E - Page 3 of 9

Meeting 1, these three categories of electric generation facilities will be used to define the 2005 baseline as well as future compliance requirements.[5]

Table A-1: Baseline CO_2 Emissions Definitions

CO_2 Emissions From:	Definition
Electric generation facilities owned by the electric public utility	• Stack emissions from electric generation facilities located in the State and owned by the Companies. • Emissions are claimed proportional with the ownership share of the unit by the Companies. (Example: If the Companies have 50% ownership share, then they claim 50% of the stack CO_2 emissions.) • These emissions are defined as Scope 1 emissions and included as such in Duke Energy's annual climate disclosures.
Electric generation facilities operated by the electric public utility	• Stack emissions from electric generation facilities located in the State and operated by the Companies. • In some cases, the Companies owned only a portion of the electric generation facility, but the Companies operated the facilities, for example, the Eastern Municipal Power Agency owned a share of Mayo and Roxboro unit 4 in 2005. In these cases, 100% of emissions from the facility are included in the baseline. • Emissions for the portion of the facility that are not directly owned by the Companies are considered Scope 3 emissions and included as such in Duke Energy's annual climate disclosures.
Electric generation facilities operated on behalf of the electric public utility	• Stack emissions from electric generation facilities located in the State, not owned or operated by the Companies, but contracted to sell their electrical output to the Companies (e.g., any in-State purchase power agreements or cogeneration facilities). • In the case of cogeneration facilities, only the CO_2 emissions associated with electrical production are included in the baseline. • These emissions are defined as Scope 3 emissions and included as such in Duke Energy's annual climate disclosures.

Source of 2005 CO_2 Emissions Data

To set the 2005 CO_2 emissions baseline, the Companies utilized the Environmental Protection Agency's ("EPA") Emission and Generation Resource Integrated Database ("eGRID").[6] eGRID is a publicly available, credible data source managed by the EPA. The data is reliably published with

[5] Duke Energy's Carolinas Carbon Plan Stakeholder Meeting Summary Report. Meeting 1 – Level-Setting and Stakeholder Feedback on Modeling Inputs. January 25, 2022. Accessible at: starw.ncuc.net/NCUC/ViewFile.aspx?Id=5e3b8376-1edd-4d3d-afc6-b78fcda7b2a9. Accessed: March 9, 2022.
[6] Emissions & Generation Resource Integrated Database (eGRID) | US EPA.

ELECTRONICALLY FILED - 2022 May 16 5:13 PM - SCPSC - ND ND-2022-4-E - Page 4 of 9

results that are repeatable and consistent over time. The eGRID is described as, "…[A] comprehensive source of data on the environmental characteristics of almost all electric power generated in the United States. The preeminent source of emissions data for the electric power sector, eGRID is based on available plant-specific data for all U.S. electricity generating plants that provide power to the electric grid and report data to the U.S. government."[7]

The EPA's data is routinely and widely used in environmental disclosures, emissions inventories and renewable portfolio standard ("RPS") and renewable energy credit ("REC") tracking across the country. The source is used today by Duke Energy for its environmental disclosures, emissions inventories and tracking RPS progress and RECs. It is used by the federal government, state and local governments, the EPA, National Labs, Independent Systems Operators, non-governmental organizations, academia and companies.[8]

eGRID's database compiles EPA's Clean Air Markets Division ("CAMD") Power Sector Emissions Data. This data is reported to the EPA by electric generating facilities to comply with regulations in 40 CFR Part 75 and 40 CFR Part 63. Most emissions data reported in eGRID is through Emissions Tracking Systems/Continuous Emissions Monitoring Systems ("CEMS"). Emissions are quantified through actual measurements at the stack with systems regularly tested and calibrated to maintain accuracy. Where CEMS data is not available, eGRID uses Energy Information Administration ("EIA") reported fuel data (EIA-923) to estimate emissions based on fuel consumed and standard emissions rates for the applicable fuel type.

Electricity generating facilities regulated by EPA's CAMD must monitor and report emissions of CO_2 annually. The Companies have been utilizing CEMS technology at their electric generation facilities for over 20 years to report actual stack emissions to the EPA.

2005 Baseline CO_2 Emissions Calculation

Table A-2 below presents the 2005 baseline for Duke Energy Carolinas, LLC ("DEC") and Duke Energy Progress, LLC ("DEP") and, together with DEC, "Duke Energy" or the "Companies"), upon which the CO_2 emissions reductions target mandated in HB 951 will be measured, with a total of 75,865,188 short tons of CO_2 emitted in 2005. The baseline includes all CO_2 emissions associated with electric generation facilities located in the State, owned, operated by or on behalf of the Companies, as reported in eGRID.

[7] The Emissions & Generation Resource Integrated Database, eGRID Technical Guide with Year 2020 Data: eGRID2020 Technical Guide (epa.gov).

[8] Duke Energy's Carolinas Carbon Plan Stakeholder Meeting Summary Report. Meeting 1 – Level-Setting and Stakeholder Feedback on Modeling Inputs. January 25, 2022. Accessible at: starw.ncuc.net/NCUC/ViewFile.aspx?Id=5e3b8376-1edd-4d3d-afc6-b78fcda7b2a9. Accessed: March 9, 2022.

ELECTRONICALLY FILED - 2022 May 16 5:13 PM - SCPSC - ND ND-2022-4-E - Page 5 of 9

Table A-2: Summary of 2005 CO_2 Emissions Baseline, North Carolina Electric Generation Facilities Owned, Operated by and Operated on Behalf of Duke Energy

Electric Generation Facility	Utility	2005 CO_2 Emissions [Short Tons]
Allen	DEC	6,224,197
Asheville	DEP	2,622,902
Belews Creek	DEC	14,219,392
Blewett	DEP	603
Buck	DEC	1,767,345
Cape Fear	DEP	1,966,488
Cliffside	DEC	3,929,892
Dan River	DEC	820,524
H.F. Lee / Wayne[1]	DEP	2,482,443
Lincoln	DEC	32,295
Marshall	DEC	13,331,274
Mayo	DEP	5,259,857
Morehead	DEP	332
Richmond / Smith	DEP	1,141,586
Riverbend	DEC	2,001,258
Rockingham	DEC	40,590
Roxboro	DEP	14,907,671
Sutton	DEP	3,524,532
Weatherspoon	DEP	1,012,322
Operated on Behalf of[2]	Other, Various	579,684
Total		**75,865,188**

Note 1: eGRID data for DEP's H.F. Lee and Wayne plants was aggregated and calculated incorrectly, resulting in a double counting of CO_2 emissions. Adjustments were made to the reported data for these plants for the purpose of establishing the 2005 baseline for compliance with HB 951. The adjustment to the reported data lowered the 2005 baseline by approximately 100,000 short tons.

Note 2: The CO_2 emissions reported in the category "Operated on behalf of" include emissions from the Rowan facility owned by Southern Power Company, and several cogeneration and Small Power Producers who were under contract with Carolina Power and Light.

Methodology for Interim Target Calculation

The interim target defined by HB 951 is a 70% reduction in CO_2 emissions from the 2005 baseline. With the 2005 baseline calculated as 75,865,188 short tons of CO_2 emitted in 2005, the calculation of the interim target is as follows.

$$\text{HB 951 Interim Target} = (1 - 0.7) * \text{HB 951 2005 } CO_2 \text{ Baseline [Short Tons } CO_2\text{]}$$

$$\text{HB 951 Interim Target} = 0.3 \times 75{,}865{,}188 \text{ Short Tons } CO_2$$

$$\text{HB 951 Interim Target} = 22{,}759{,}556 \text{ Short Tons } CO_2$$

ELECTRONICALLY FILED - 2022 May 16 5:13 PM - SCPSC - ND ND-2022-4-E - Page 6 of 9

Achieving the interim target would require that the Companies limit CO_2 emissions from electric generation facilities owned, operated by or operated on behalf of, the Companies located in the State to 22,759,556 short tons of CO_2 in the compliance year.

Consideration of the Geographic Boundary

HB 951 specifies that the CO_2 emission reduction targets include only emissions from in-state electric generating facilities; however, considering the Companies' dual-state systems, stakeholders expressed concern for the Companies siting new CO_2 emitting resources outside the State, which would be counterproductive to achieving regional CO_2 emissions reductions. Recognizing the seemingly clear language of HB 951 and the questions raised by stakeholders, the Companies need Commission guidance regarding CO_2 emissions accounting under HB 951. Specifically, the Commission will need to determine whether it intends to deem CO_2 emissions from out-of-state generating resources selected to be part of the Carbon Plan as if such emissions occurred in the State.

In modeling the Carbon Plan to ensure compliance with the HB 951 CO_2 emissions reductions target, the Companies assumed that any new CO_2 emitting resources would be sited in North Carolina. To operate the Companies' dual-state systems reliably and cost-effectively for all Carolinas' customers, the Companies will site all new resources optimally inside or outside of North Carolina based on several key parameters such as appropriateness of the site for the type of generation, access to fuel, ability to leverage existing infrastructure to reduce costs and evaluation of community impacts. The Companies are committed to systemwide CO_2 emissions reductions, and this planning approach ensures that the Companies are setting a path to carbon neutrality for the entire system by 2050, subject to further guidance from the Commission regarding treatment of emissions from out-of-state generating resources.

Progress to Date: CO_2 Emissions Reductions Since 2005

Over the past two decades, the Companies have been transforming the way they do business by investing in a large amount of cleaner energy resources to accelerate the clean energy transition, modernizing the grid to make it more resilient and able to accommodate a more decentralized, Distributed Energy Resources and transforming the customer experience by leveraging advancements in digital technologies and communications tools. Since 2005, Duke Energy has reduced the CO_2 emissions associated with its generation fleet in all jurisdictions by over 40% along with achieving reductions in sulfur dioxide emissions by over 95% and nitrogen oxide emissions by over 80%.

Specifically, within North Carolina, the Companies have reduced CO_2 emissions from electric generation facilities over 45% since 2005, as presented in Table A-3 below.

ELECTRONICALLY FILED - 2022 May 16 5:13 PM - SCPSC - ND ND-2022-4-E - Page 7 of 9

Table A-3: 2021 CO_2 Emissions as Compared to the 2005 CO_2 Emissions Baseline, North Carolina Electric Generation Facilities Owned, Operated by and Operated on Behalf of Duke Energy

Electric Generation Facility	Utility	2005 CO_2 Emissions [Short Tons]	2021 CO_2 Emissions [Short Tons][1]
Allen	DEC	6,224,197	219,009
Asheville	DEP	2,622,902	1,592,328
Belews Creek	DEC	14,219,393	7,610,767
Blewett	DEP	603	489
Buck	DEC	1,767,345	1,869,294
Cape Fear[2]	DEP	1,966,488	0
Cliffside	DEC	3,929,892	3,647,287
Dan River	DEC	820,524	1,778,083
H.F. Lee / Wayne	DEP	2,482,443	2,493,925
Lincoln	DEC	32,295	247,693
Marshall	DEC	13,331,274	6,268,282
Mayo	DEP	5,259,857	1,690,889
Morehead[3]	DEP	332	0
Richmond / Smith	DEP	1,141,586	3,775,824
Riverbend[4]	DEC	2,001,258	0
Rockingham	DEC	40,590	455,638
Roxboro	DEP	14,907,671	5,922,557
Sutton	DEP	3,524,532	1,757,741
Weatherspoon	DEP	1,012,322	3,372
Operated on Behalf of	Other, Various	579,684	1,669,908
Total		**75,865,188**	**41,003,085**

Note 1: 2021 data is CEMS data, that has been reported to EPA, but is not yet validated and reported in the eGRID database. eGRID data publication generally lags two years from the year in which the emissions occurred.
Note 2: Cape Fear was decommissioned in 2012.
Note 3: Morehead was decommissioned in 2012.
Note 4: Riverbend was decommissioned in 2013.

It is important to recognize that CO_2 emissions may fluctuate each year as many variables can impact the level of emissions in a given year, including demand for electricity as driven by economic conditions, fuel prices, energy resource additions, resource retirements, weather variability and extreme weather events, economic growth and load growth driven by the electrification of transportation and buildings.

Reporting

HB 951 specifies that the Companies review and update their Carbon Plan every two years. However, HB 951 does not specify any reporting requirements on the Companies' status with authorized carbon

ELECTRONICALLY FILED - 2022 May 16 5:13 PM - SCPSC - ND ND-2022-4-E - Page 8 of 9

reduction targets. Despite the absence of a reporting requirement, the Companies are committing to include an update on the status of carbon reduction targets to the Commission in its biennial Carbon Plan updates.

Carbon Offsets

HB 951 states that carbon offsets can be utilized to meet the 2050 carbon neutrality target, "provided that offsets are verifiable and do not exceed 5% of the authorized reduction target."[9] In addition, the Commission, in the Carbon Plan Procedural Order, requested the Companies present in the Plan, "the methodology used to quantity the reduction associated with any offset proposed and the methodology for verifying any such offset."[10] This section includes the response to this request.

A carbon offset is a project or effort that results in a reduction, avoidance or removal of GHG emissions from the atmosphere. Measured in tons of carbon dioxide equivalent ("CO_2e"), offsets are transferable instruments that are purchased and can be retired by companies to reduce their overall carbon footprint. Projects that can generate carbon offsets range from activities that strictly reduce emissions, such as renewable energy development, to pursuits that increase carbon storage, such as reforestation. The Environmental Defense Fund reports that companies are utilizing offsets at an increasing rate, with 20% of the companies listed on major global exchanges purchasing offsets in 2018 and 32% in 2019.[11]

At the Carbon Plan Stakeholder Meeting 1, the Companies recognized that there is significant uncertainty regarding how offset markets will evolve over time. These markets could rely on forest offset projects, excess reductions from other locations, yet-to-be-commercialized carbon reduction technologies or, most likely, a combination of these types of offsets. Standard principles have been developed to frame the environmental integrity of offsets. These standards help ensure that decarbonization efforts that include offsets have a meaningful impact on reducing global emissions. The Carbon Credit Quality Initiative's criteria for high caliber offsets are outlined below.[12]

- **Additionality:** Emissions reductions would not have occurred in the absence of the offsetting program and revenue generated from selling offsets.
- **Verifiability:** Emissions reductions should be monitored, reported and verified by a third party.
- **Permanence:** Emissions reductions should be permanent.

[9] House Bill 951, Part I, Section 1.

[10] Carbon Plan Procedural Order at 3.

[11] Environmental Defense Fund. *Trends in the Voluntary Carbon Markets: Where We Are and What's Next*. April 2021. Available at: https://www.edf.org/sites/default/files/documents/trends-voluntary-carbon-markets_1.pdf.

[12] The Carbon Credit Quality Initiative. Methodology for Assessing the Quality of Carbon Credits. November 2021. Available at: https://carboncreditquality.org/download/MethodologyForAssessingTheQualityOfCarbonCredits.pdf.

ELECTRONICALLY FILED - 2022 May 16 5:13 PM - SCPSC - ND ND-2022-4-E - Page 9 of 9

- **Avoid Double Counting:** Offset project is robustly accounted for, preventing double counting and double monetization of efforts.

- **Negative Impact:** Offset project does not cause any negative environmental or social externalities.

As noted above, third-party organizations play a critical role in ensuring offsets are monitored, reported and verified. This process increases transparency in the quantification and certification of offsets to companies and government entities. Examples of organizations which have developed offset standards include governmental programs such as California's Compliance Offset Program, as well as voluntary offset programs such as The Gold Standard, the American Carbon Registry, the Verified Carbon Standard and the Climate Action Reserve.

Although HB 951 allows for the use of offsets to address the last 5% of emissions to achieve carbon neutrality in the year 2050, the Companies have no plans to utilize offsets in the achievement of the HB 951 long-term target. This strategy aligns with the World Bank's recommendation that "corporations should prioritize reducing their own operational and value chain emissions first, with offsets playing a supplementary role".[13]

The Companies' plan regarding carbon offsets was discussed with stakeholders at the Carbon Plan Stakeholder Meeting 1. Given the Companies' current plans to not use offsets, the level of uncertainty in offset markets, and the long trajectory of this Plan, the Companies are not recommending a specific offset strategy at this time; however, before using any carbon offsets, a calculation methodology would be presented for regulatory approval. As this Plan progresses and offset usage and calculation methodologies evolve, the Companies will revisit this topic.

[13] The World Bank. *State and Trends of Carbon Pricing 2021*. May 25, 2021. Available at: https://www.smithschool.ox.ac.uk/publications/reports/Oxford-Offsetting-Principles-2020.pdf. https://openknowledge.worldbank.org/handle/1098635620.