DOCKET NO. E-100, SUB 179

ATTACHMENT B

Report and Comments on Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's 2022 Proposed Carbon Plan

NCUC Docket NO. E-100, Sub 179

Addressing Low-Income Energy Affordability in the Carolinas Carbon Plan

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Qualifications

Rory McIlmoil is the Senior Energy Analyst at Appalachian Voices, where he leads and supports research, analysis and reporting on how utility and state energy policies and rate structures will impact households and the environment. Mr. McIlmoil joined Appalachian Voices in 2013 to launch the organization's work promoting utility energy efficiency finance programs through rural electric cooperatives and investor-owned electric utilities. His professional responsibilities include researching energy policies, analyzing the impact on ratepayers and the environment of energy-related policies, and advocating for utility affordability and clean energy programs and that equitably benefit families and local communities. His recent work includes testifying before the NC Utilities Commission on the impact of Duke Energy Carolinas' proposed rate increase in the 2019 rate case on energy burdens for low-income customers, serving as an active participant in Governor Roy Cooper's Clean Energy Plan development process and subsequent NC Energy Regulatory Process, analyzing the impact on ratepayers of NC House Bill 951, serving as a leading partner on the "Energy Insecurity in the Southeast" project led by the Nicholas Institute at Duke University, and also serving as a leading participant and sub-team co-lead for the Low-Income Affordability Collaborative. Mr. McIlmoil graduated from Furman University with a Bachelor of Science in Earth and Environmental Science and received a Master of Arts in Global Environmental Policy from American University's School of International Service. His full resume follows this report.

Executive Summary

Decarbonizing the grid through a transition to clean, renewable energy resources; battery storage; and substantial investments in energy efficiency and demand-side management is critical for North Carolina. That transition must proceed rapidly to confront the worst impacts of climate change and protect public health. However, any plan which guides that transition must, as a core and integrated objective of the plan, directly address existing and future energy affordability challenges and impacts for North Carolina households, especially low-income and otherwise vulnerable households.

Unfortunately, despite listing "affordability" as a core objective of the Carbon Plan, the Companies neglect and even refuse to define what they mean by affordability, either generally or in the context of the Carbon Plan. Instead, the Companies inappropriately conflate the terms "least cost" and "affordability." As a result, both the Carbon Plan and the Companies' responses to Appalachian Voices' discovery requests lack any definition of or metrics related to affordability, reference to affordability definitions or challenges identified and discussed throughout the Low-Income Affordability Collaborative process, or analysis of the impacts resulting from affordability challenges such as arrearages, disconnections or other impacts that may result from the implementation of the Companies' proposed Carbon Plan. Additionally, the Companies' perception that their affordability objective is a matter of presenting a "least cost" plan for reducing carbon emissions rather than of addressing existing and potential affordability challenges and impacts experienced by households they serve is reflected in the exclusion from the Carbon Plan of any investments or programs that would reduce costs for residential customers or, at a minimum, offset future costs projected to result from the Carbon Plan.

In this report we detail the scale and depth to which North Carolina households served by Duke Energy Carolinas and Duke Energy Progress already struggle with affording their electric bills, and highlight how the proposed Carbon Plan will exacerbate those challenges. To do so we pull from the Companies' own analysis for the 12-month period preceding the onset of the COVID pandemic, from the Companies' submission of monthly arrearage and disconnection data since the onset of the pandemic, and from the results of the energy burden and affordability gap analysis produced by Physicians, Scientists, and Engineers for Healthy Energy (PSE Health Energy) in their report "*Review and Comments on Duke Energy Carolina, LLC and Duke Energy Progress, LLC's 2022 Proposed Carbon Plan*," which is also attached to the Initial Comments of Appalachian Voices, Attachment A.

Key findings detailing the energy affordability challenges currently experienced by low-income and otherwise vulnerable households served by the Companies include:

1. More than 980,000 residential households served by the Companies in North Carolina qualify as low-income per federal poverty guidelines (less than 200% of the Federal

Poverty Level, or "FPL"). That represents nearly one-third (32%) of the Companies' combined reported residential customer base in the state.

2. An estimated 231,165 low-income households meet the Companies' stringent definition of "arrears struggling" households, defined as customers who found themselves in an arrearage situation in which they (1) were behind on paying their average/regular bill amount for six or more months during the 12-month pre-COVID period or (2) were behind by twice the amount (or more) of their average bill for two or more months. This represents approximately 24% of all low-income households. Another 13% of non-low-income households also met the arrears definition, amounting to more than 277,000 households. In total, more than a half-million households were identified as "arrears struggling," representing nearly one-sixth of all households served by the Companies in North Carolina.
3. Relating to the impacts stemming from affordability challenges, during the 12-months prior to the pandemic, the Companies reported a total of nearly 228,000 residential disconnections for non-payment, or 19,000 disconnections per month.
4. Per PSE Healthy Energy's analysis, the lowest-income households served by the Companies, amounting to nearly 200,000 total households, have an average energy burden that exceeds 15% of total household income, which represents an extremely unaffordable energy cost. The next highest income bracket, consisting of approximately 300,000 households, experiences energy burdens ranging from 6% to above 15%, sometimes greater. Overall, a total of 850,000 households falling below 200% FPL exceed the 6% threshold for affordable home energy costs, accounting for 73% of all households captured in PSE Healthy Energy's analysis.
5. As of May 2022, the month when the Companies filed their proposed Carbon Plan and the most recent month for which data has been published, nearly 575,000 households were in arrears, owing more than $213 million—representing a 26% increase in the number of customers in arrears and a 79% increase in total arrearages compared to May 2021.

Clearly a substantial portion of the Companies' residential customer base in North Carolina is already struggling with significant challenges and severe impacts related to energy affordability. While qualifying as low-income serves as a foundational condition placing households at risk of experiencing affordability challenges, the Companies' analytics produced for the Low-Income Affordability Collaborative also concluded that building energy intensity (electricity use per square foot), high Winter and Summer peak usage and electricity cost burden – three inter-related factors – serve as significant contributors to affordability challenges. Based on the analytics the Companies acknowledged that these factors were likely due to energy-inefficient building stock, heating and cooling systems and appliances.

Despite the breadth of data and analysis detailing affordability-related struggles experienced by their customers, which was available to the Companies well in advance of the Carbon Plan filing, the plan itself lacks any targeted investments or solutions that would alleviate those challenges or offset the exacerbating impacts of the investments proposed in the Carbon Plan. If the Companies are genuinely committed to affordability as a core objective in the Carbon Plan they must go beyond a strict "least cost" approach and submit a new plan that directly address affordability challenges and impacts for low-income and otherwise vulnerable households.

Doing so requires the inclusion of short-term bill assistance and arrearage management programs that alleviate existing challenges customers face with affording their electric bills. It also requires proactive and aggressive long-term investments in energy efficiency and demand-side management to reduce household and system costs related to winter and summer peak energy usage resulting from energy-inefficient buildings (insulation, air sealing, etc.), heating and cooling systems and appliances. It requires expanding distributed solar options to include customer-owned and community-based or shared solar programs that are accessible and targeted to low-income and otherwise economically vulnerable households. Such investments not only enhance affordability and reduce the long-term need for funding bill assistance programs, but also contribute to decarbonization, improved grid reliability and resiliency, and reducing or avoiding the need for new gas capacity, all of which lower costs for customers. And finally, it requires modeling the potential for a regional competitive wholesale market and use of performance-based regulation and appropriate performance incentive mechanisms to enhance affordability, reliability and carbon reductions compared to the currently proposed Carbon Plan.

To that end, and pursuant to the findings of this report, we recommend that the Commission:

1. Require that the Companies define and develop metrics for assessing "affordability" in a manner that describes actual experiences and impacts faced by its residential customers. To this end we recommend that the Commission consider requiring that the Companies consider adopting the definition of affordability codified by the California Public Utilities Commission and proposed during the Low-Income Affordability Collaborative Sub-team B work process, which is "the degree to which a representative household is able to pay for an essential utility service charge, given its socioeconomic status.
2. Require that the Companies revise the proposed Carbon Plan to incorporate and model the affordability and carbon reduction benefits of customer bill assistance and arrearage management programs (such as those proposed through the Low-Income Affordability Collaborative), low-income weatherization and other energy efficiency investments, and low-income distributed energy and demand reduction investments. The Commission should require the analysis to include impacts on low-income customer bills, electricity cost burdens, arrearages, disconnections for non-payment, and carbon emissions via the avoidance of the "need" to build new methane gas generation.

3. Require the Companies to model as a sensitivity analysis how a regional competitive wholesale market and legislatively approved performance-based regulation would impact resource selection and portfolio costs for the Carbon Plan, and by extension, carbon emissions and customer affordability.

Introduction

Decarbonizing the grid through a transition to clean, renewable energy resources; battery storage; and substantial investments in energy efficiency and demand-side management is critical. That transition must proceed rapidly to confront the worst impacts of climate change and protect public health. However, any plan which guides that transition must, as a core and integrated objective of the plan, directly address (rather than merely pay lip service to) existing and future affordability challenges and impacts.

Directly addressing affordability challenges and impacts requires the inclusion of short-term bill assistance and arrearage management programs that alleviate existing challenges customers face with affording their electric bills. It also requires proactive and aggressive long-term investments in energy efficiency and demand-side management to reduce household and system costs related to winter and summer peak energy usage resulting from energy-inefficient buildings (insulation, air sealing, etc.), heating and cooling systems and appliances. And it requires expanding distributed solar options to include customer-owned and community-based or shared solar programs that are accessible and targeted to low-income and otherwise economically vulnerable households. Such investments not only enhance affordability and reduce the long-term need for funding bill assistance programs, but also contribute to decarbonization, improved grid reliability and resiliency, and reducing or avoiding the need for new gas capacity, all of which lower costs for customers.

Unfortunately, these types of programs and investments are largely absent from Duke Energy Carolinas ("DEC") and Duke Energy Progress ("DEP") (collectively "the Companies")'s proposed Carbon Plan, despite findings from the Low-Income Affordability Collaborative (LIAC) showing the widespread and significant challenges relating to affordability already being experienced by hundreds of thousands of North Carolina households served by the Companies.

Duke Energy Conflates "Cost" With "Affordability," and Neglects to Define "Affordability" in the Context of the Carbon Plan

After nearly a year of coordinating and participating in the LIAC, and even though definitions were discussed and proposed throughout the course of the LIAC process, it is clear that Duke Energy continues to conflate terms like "least cost," "rates," and "customer bill impacts" with "affordability." While related, they are not the same. "Least cost" does not mean "affordable," it

merely means "less costly than the alternative." For instance, a low-income mother driving her children to daycare every day likely cannot afford to pay $5 a gallon, but she still has to drive her children to daycare so that she can go to work. On the way she sees one gas station charging $4.89 a gallon and another charging $4.99 a gallon. Neither is affordable for the mother, but the price at the first station offers a lower cost than the second.

These are the options which Duke Energy is presenting in the Carbon Plan. North Carolina needs to decarbonize and transition to a clean energy grid, and that transition will come with a price tag that varies depending on the investments made to reach that goal. Even though those investments may represent the "least cost" (e.g., "less costly") pathway relative to other options, neither is going to be "affordable" for customers already struggling to afford their current electric bills.

In some instances, the Companies seem to understand the distinction between "cost" and affordability by using the term "affordable electricity," and further, stating that "[w]hile PVRR [e.g., "cost"] is an important metric for the long run costs of a portfolio, the Companies are also concerned with the immediate cost to customers and emphasize the ability to provide *affordable energy* to customers as a core target of this Carbon Plan."[1] However, when asked how the Companies define "affordability" in general and in the context of the carbon plan, the response reverted back to the concepts of "least cost" and "affordable rates," stating: "House Bill 951 requires a 'least cost' pathway to achieve the targeted carbon reduction goals. As such, the Companies' Carbon Plan identifies the least-cost path to achieve the targeted carbon reductions and will therefore ensure that the Companies rates remain affordable and below the national average."[2]

The following are example excerpts from the Carbon Plan that mention affordability:

> *"This dual-state approach to least-cost resource planning has benefited customers in the Companies' service territory across the Carolinas through the provision of reliable and affordable electric service with a decreasing carbon intensity."*[3]
>
> *"Furthermore, the energy transition is supported by a broad range of the Companies' customers and, when combined with continued affordable and competitive rates, will play a crucial role in retaining existing businesses and attracting new economic development to North Carolina and South Carolina (together, the "Carolinas")."*[4]

[1] DUKE ENERGY, CAROLINAS CARBON PLAN 82 Appendix E (May 16, 2022) (emphasis added) [hereinafter CAROLINAS CARBON PLAN].
[2] DE Response to Appalachian Voices DR. 1-1.
[3] CAROLINAS CARBON PLAN, *supra* note 1, at 1 Executive Summary (emphasis added).
[4] *Id.* at 1 (emphasis added).

> *"The Plan assesses each of the portfolios against four core Carbon Plan objectives (CO2 reduction, affordability, reliability and executability), all of which are grounded in prudent utility planning and operation."*[5]
>
> *"The Companies intend to take a multipronged approach to maintaining affordable and reliable service while also meeting CO2 emissions reduction targets."*[6] *"Each portfolio presents a road map to transition away from continued reliance on emissions intensive resources via orderly retirement of coal facilities and prudent, planned additions of a diverse mix of low-carbon and emissions-free resources, all while keeping a keen eye on reliability and affordability."*[7]
>
> *"The Companies are committed to the continued provision of affordable electricity for residents, businesses, industries, and communities in the Carolinas. Seeking the appropriate pace of technology adoption to achieve CO2 emissions reductions targets requires careful balancing of a variety of factors, including affordability. Throughout the Carbon Plan stakeholder process, stakeholders consistently reinforced the importance of mitigating cost impacts on customers and communities."*[8]

Duke mentions "cost" and "affordability" together while only presenting "cost" impacts, and nothing for "affordability" impacts. The Companies provide no definition of or metrics related to affordability, no reference to "affordability" definitions or challenges identified and discussed throughout the LIAC process, and no analysis of impacts resulting from affordability challenges such as arrearages, disconnections or other impacts that may result from the implementation of any of the four carbon plan portfolios.

Despite Including Affordability as a Core Carbon Plan Objective, Duke Energy Did Not Analyze any Affordability-Related Impacts of the Plan

Unlike the three other stated core objectives of the Carbon Plan—carbon reduction, reliability, and executability—Duke Energy failed to analyze affordability impacts of the four Carbon Plan portfolios for its North Carolina customers beyond the "least cost" analyses. As one example of that neglect, Appalachian Voices asked the Companies to

> Provide all data, analysis, documentation, modeling, etc. detailing how Duke incorporated data and analysis from/of the detailed customer usage and demographics dataset produced by Duke and Acxiom for purposes of the [LIAC]

[5] *Id.* at 2 (emphasis added).
[6] *Id.* at 9 (emphasis added).
[7] *Id.* at 12 (emphasis added).
[8] *Id.* at 20 (emphasis added).

> for the purpose of analyzing the impact of the four carbon plan portfolios on customers of different income levels, housing tenure, housing type, race, age, region (urban vs. rural) and other customer segments analyzed for the LIAC." The Companies responded that "[a]t the time the Carbon Plan was being developed, the analytics and data pipelines used for the Low-Income Affordability Collaborative (LIAC) were still a work in progress. Because of this overlap in the timing, LIAC analytic results were not specifically included in the Carbon Plan. However, as stated in the Carbon Plan, the Companies are committed to use the findings from the LIAC going forward to expand the Companies' programs and support customers.[9]

The actual timeline of events belies this response. Duke Energy and Acxiom produced the initial version of the noted analytics in September 2021, with refinements and additions being performed for new versions provided to the LIAC in October, November and December 2021, with the final version (including new statistical analysis) being provided in March 2022. The Companies submitted their proposed carbon plan on May 16, 2022. In other words, the datasets for incorporating a deep analysis of potential affordability impacts on residential customers that would result under the four proposed carbon plan portfolios were available as early as September of 2021, while even the final version was available for six weeks prior to the Companies' submission of the plan.

Appalachian Voices further asked the Companies to "[p]rovide any datasets, analysis, modeling, documentation, etc. Duke used or produced to determine how the estimated cost of each of the four portfolios will impact arrearages and disconnections for residential customers, particularly low-income customers." To this request, the Companies responded that "[t]he question seeks information that is outside of the scope of the Carbon Plan proceeding," and again reverted back to conflating "least cost" with affordability.[10] As arrearages and disconnections directly represent the outcomes of affordability challenges faced by Duke Energy's customers, however, the admission that the Companies consider such an analysis to be "outside the scope of" the Carbon Plan underscores their lack of commitment to addressing actual affordability concerns.

Finally, even when an opportunity exists within the Carbon Plan to take energy efficiency modeling that is already included in the analysis one step further and estimate the modeled energy savings on energy customers' monthly bills, the Companies neglected to produce this analysis. For instance, when asked to "[p]rovide all data, analysis, documentation, modeling, etc. showing the electricity savings and reduction in monthly bills that will result from all energy efficiency (generally) and low-income energy efficiency programs Duke currently offers and has considered (e.g. Energy Burden Reduction Pilot Program) for future programs for any of its

[9] DE Response to Appalachian Voices DR. 1-10.
[10] DE Response to Appalachian Voices DR. 1-7.

portfolios," the Companies responded that "[a]s part of the preparation of the Carbon Plan the Companies did not perform specific modeling or analysis of the electricity savings and reduction in customers' monthly bills that will result from all energy efficiency (generally) and low-income energy efficiency programs Duke currently offers."[11] Taken as a whole, the Companies' refusal to demonstrate the purported efficiencies and cost savings of their models once again undermines the Companies' purported commitment to affordability as a core Carbon Plan objective.

Duke Energy's Existing Residential Customer Base Already Faces Significant Affordability Challenges

Low-Income Households Served by Duke Energy in North Carolina

The Companies report that more than 980,000 residential households served by the Companies in North Carolina qualify as low-income per federal poverty guidelines (less than 200% of the Federal Poverty Level, or "FPL"). That represents nearly one-third (32%) of the Companies' combined reported residential customer base in the state.[12] Notably, but to be expected due to the economic impacts of COVID-19 since 2020, this is a higher percentage of the residential customer base than what the Companies' analysis showed for the 12-month period prior to the COVID-19 pandemic (29%).[13]

"Arrears Struggling" Households

While the LIAC Sub-team A "Assessment of Customer Challenges Relating to Energy Affordability" did conclude that qualifying as a low-income household likely contributes to energy affordability challenges,[14] low-income household qualification does not automatically lead to affordability-related impacts such as being in arrears, disconnection for non-payment, or general energy insecurity. However, *as a means for providing a metric for assessing "affordability challenges"* (something the Companies neglected to do for the purposes of the Carbon Plan), Duke Energy, for the benefit of the LIAC stakeholder group, created a definition for "arrears struggling" households, which are customers who found themselves in an arrearage situation in which they (1) were behind on paying their average/regular bill amount for six or more months during the 12-month pre-pandemic period or (2) were behind by twice the amount (or more) of their average bill for two or more months.[15]

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[11] DE Response to Appalachian Voices DR 1-16.
[12] DE Response to Appalachian Voices DR 1-17.
[13] *See* Joint N.C. Low-Income Affordability Collaborative Q. Progress Rep. at Appendix F, N.C. Util. Comm'n Docket E-7 Subs 1213, 1214, 1187 and E-2 Subs 1219, 1193 (Apr. 25, 2022), https://starw1.ncuc.gov/NCUC/ViewFile.aspx?Id=ae12f626-823d-4ae7-86c5-bc4e49aa4208 ("Revised LIAC Customer Analytics") [hereinafter Joint N.C. Low-Income Affordability Collaborative].
[14] *Id.* at Part 2.1 ("Assessment of Customer Challenges").
[15] *See id.* at Appendix F.

During the LIAC process, Appalachian Voices expressed concern that the Companies' definition for "arrears struggling" was too restrictive, capturing only those households that were experiencing "extreme" difficulties paying their electric bills while potentially leaving out many households with financial challenges that may be significant, albeit falling outside Duke's narrow definition of "extreme difficulties." However, even Duke's restrictive framing produced some concerning results. For instance, the analysis for "arrears struggling" households, as provided to the LIAC stakeholder group, found that approximately 23.6% of households falling under 200% FPL also met the Companies' definition of "arrears struggling."[16] Applying that percentage to the current low-income residential customer base (980,773) results in an estimated 231,165 low-income households that meet the stringent definition of customers who "struggle" with arrears.

Notably, the Companies' LIAC analytics also showed that approximately 13.1% of non-low-income customers also met the definition for "arrears struggling." Applying that percentage to the current number of households Duke reports as falling above the 200% FPL threshold amounts to approximately 277,367 households that meet the Companies' definition of "arrears struggling households." Overall, as shown in Table 1 below, more than a half million North Carolina households are estimated to meet Duke Energy's stringent definition of what constitutes an "arrears struggling" household, representing nearly one-sixth of the Companies' total residential customer base in North Carolina.

Table 1: Households above and below 200% FPL meeting Duke Energy's definition of "arrears struggling" in 2022

	# Customers	Arrears struggling	% Arrears struggling
Low-income	980,773	231,165	23.6%
Non-low income	2,112,715	277,367	13.1%
Total	**3,093,488**	**508,532**	**16.4%**

Note: the totals for "arrears struggling" and "% arrears struggling" are somewhat higher than what was reported in the Assessment of Customer Challenges Related to Affordability produced for the LIAC. This is the result of the percent of the residential customer base qualifying as low-income being higher in 2022 (as reported by the Companies) than it was during the 12-month pre-COVID period (again, as reported by the Companies).

[16] *Id.*

Customer Impacts Associated With Affordability Challenges

Additionally, in the 12 months prior to the COVID-19 pandemic—the analytical period for which the Companies analyzed customer affordability challenges—the Companies reported a total of nearly 228,000 residential disconnections for non-payment, an average of approximately 19,000 per month.[17] In the final LIAC Analytics slide deck, the Companies reported that approximately 186,000 households were included in the statistical analysis for disconnections for non-payment (while noting that "some records had to be dropped during analysis given missing data for some of the variables"), but in the same slide deck reported approximately 96,000 disconnections of unique households.[18] Regardless of whether reported disconnections represented unique households or not, 228,000 disconnections over a 12-month period is a significant number and highlights the severe impact affordability challenges the Carbon Plan provides for Duke Energy's residential customers.

Then, at the onset of the pandemic and with the institution of the Commission and Governor Cooper's moratoria on utility disconnections, the Companies were required to begin reporting detailed monthly data on customer counts, the number of customers in arrears, the amount of total arrearages, and other related data.

As shown in Table 2, in May 2020, the Companies reported that nearly 500,000 residential customers were more than 30 days past due on their bills, owing $116.7 million (average of $39 per customer in arrears).[19] A year later, the number and percent of customers in arrears had dropped, but the amount of arrearages had risen by $10 million.[20]

However, as of May 2022, the month when the Companies filed their proposed Carbon Plan and the most recent month for which data has been published, nearly 575,000 households were in arrears, owing more than $213 million—a 26% increase in the number of customers in arrears and a 79% increase in total arrearages compared to May 2021. That is a substantial increase, and while those counts will fluctuate throughout the remainder of 2022, this is the most recent data on arrearages, and it provides a useful baseline for understanding existing affordability challenges faced by North Carolina households served by the Companies.

[17] DEC and DEP monthly disconnection reports for March 2019 through February 2020 are filed in N.C. Util. Comm'n Docket M-100 Sub 61A.
[18] *See* Joint N.C. Low-Income Affordability Collaborative at Appendix F.
[19] Exec. Order 124 Monthly Data for May, 2020 Rep. to the Governor, N.C. Util. Comm'n Docket M-100 Sub 158 (June 18, 2022).
[20] NCUC COVID -19 State of Emergency Util. Reporting Data Through May 2022, N.C. Util. Comm'n Docket M-100 Sub 158 (July 1, 2022).

Table 2: Trends in residential arrearages during May months for Duke Energy customers since COVID onset

	No. customers	No. in arrears	% in arrears	Total arrears ($M)	Arrears per customer
May 2020	3,028,434	498,718	16.5%	$116.7	$39
May 2021	3,055,901	457,309	15.0%	$126.0	$41
May 2022	3,116,340	574,556	18.4%	$213.4	$68
5/20 to 5/21	**27,467**	**(41,409)**		**$9.0**	**$3**
Percent change	0.9%	-8.3%		7.7%	6.7%
5/21 to 5/22	**60,439**	**117,247**		**$87.7**	**$27**
Percent change	2.0%	25.6%		69.8%	66.5%

Energy Cost Burden and Energy Affordability Gap

Appalachian Voices contracted with Physicians, Scientists, and Engineers for Healthy Energy ("PSE Healthy Energy") to analyze current energy cost burdens (the percentage of a household's pre-tax income spent on home energy costs) and the "affordability gap" (the total amount of money needed in the form of financial assistance to bring energy bills below the six percent threshold) at various income levels for Duke Energy residential customers in North Carolina. Those results are detailed in PSE Healthy Energy's report, "*Review and Comments on Duke Energy Carolina, LLC and Duke Energy Progress, LLC's 2022 Proposed Carbon Plan*," which is also attached to the Initial Comments of Appalachian Voices, Attachment A. However, as the analysis relates to affordability challenges, it is useful to highlight key findings here. We recommend reviewing the report for more detail on the analysis and findings related to energy cost burden and the affordability gap.

The following are some key findings from that report:

- Approximately 1.15 million households[21] served by Duke Energy fell under 200% FPL in 2019, with 500,000 of those falling under 100% FPL. The lowest incomes experience the highest levels of energy cost burdens, with decreasing proportional energy costs as incomes increase.
- The lowest-income households, amounting to nearly 200,000 total households, have an average energy burden that exceeds 15% of total household income, which represents an extremely unaffordable energy cost. The next highest income bracket, consisting of

[21] The number of households PSE Healthy Energy's analysis identified as falling under the 200% FPL threshold is approximately 15% higher than the number reported by the Companies in the file "Worksheet in Appalachian Voices DR 1-17." PSE Healthy Energy describes the discrepancy as resulting from "using publicly available data in the absence of private data available to the utility." See Attachment A, Review and Comments on Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's 2022 Proposed Carbon Plan at 16 [hereinafter PSE Report].

approximately 300,000 households, experiences energy burdens averaging 6% to 15%, sometimes greater.

- Overall, a total of 850,000 households falling below 200% FPL exceed the 6% threshold for affordable home energy costs, accounting for 73% of all households captured in PSE Healthy Energy's analysis.[22] That also accounts for approximately 27% of the Companies' reported number of total residential customers in North Carolina.
- Conservatively, the energy affordability gap adds approximately $630 million annually for households with incomes less than 200% FPL, with the most significant amount needed for the very lowest income brackets.

Based on the number of arrearages and disconnections Duke Energy's residential customer base has endured in recent years, it is abundantly clear that the implementation of any of the Companies' four Carbon Plan portfolios will exacerbate both the challenges and impacts low-income households already experience due to the unaffordability of their electric and total energy bills.

Impact of Monthly Bill Increases on Household Energy Burden

Appalachian Voices submitted testimony and analysis in the DEC 2019 rate case projecting how DEC's proposed rate increase would impact low-income customers (less than 150% FPL) in terms of increased energy burdens.[23] Per our analysis, as of 2019, the average household energy burden for the 332,000 low-income households served by DEC exceeded the 6% affordability threshold, while 141,000 of those households experienced a "severe" energy burden exceeding 10.9%.[24] DEC's estimate of customer bill impacts in the initial filing showed an increase of $8.06 per month, which approximates the $8 estimated monthly impact of DEC residential customers in 2030 resulting from Portfolio 1 in the proposed Carbon Plan. Using the bill impact value from DEC's rate case filing, we calculated that such an increase would have resulted in more than 57,000 low-income households (17% of all low-income households) moving into the "severe" energy burden category.[25] Considering that result as a proxy for the 2030 impact on energy burdens for low-income DEC households as a result of the Carbon Plan, the impact from an apparently modest increase in monthly bills should not be underestimated.

The Companies' LIAC analytics illustrate how energy burdens exceeding the 6% threshold impact increase the likelihood that a household will meet the definition of "arrears struggling" and/or be disconnected for non-payment. For the arrears definition, the analytics showed that, compared to a 6% energy burden, a household with a 10% energy burden is 36% more likely to meet the

[22] PSE Report at 16.
[23] *See* N.C. Util. Comm'n Docket E-7 Sub 1214.
[24] APPLIED PUB. POL'Y RSCH. INST. FOR STUDY AND EVALUATION, LIHEAP ENERGY BURDEN EVALUATION STUDY 12 (July 2005), https://www.acf.hhs.gov/sites/default/files/documents/ocs/comm_liheap_energyburdenstudy_apprise.pdf.
[25] Direct Test. Of Rory McIlmoil for Ctr. Biological and Appalachian Voices, N.C. Util. Comm'n Docket E-7 Sub 1214 (Feb. 18, 2020).

arrears definition, while a 12% burden level renders a household 52% more likely to meet the definition. For disconnections, the relative likelihoods are 8% and 10%, respectively.[26]

Factors Contributing to Affordability Challenges

As relevant to our following comments on affordability-focused policies and investments that should have been included in the Carbon Plan (many of which also contribute to carbon reductions), the Assessment for the LIAC identified three related factors—household energy intensity, Winter and Summer Impact, and electric bill burden—as strong contributing factors to high electric bills and/or associated affordability challenges for low-income and "arrears struggling" customers:

1. **Household/building energy intensity:** Low-income/ arrears struggling households have a much higher energy intensity (kilowatt-hours consumed per square foot) than households above the 200% FPL threshold. In general, rural, younger, multi-family, and manufactured/mobile home and rental households also experience higher energy intensity, all of which are categories disproportionately comprised of lower-income customers and households. These considerations are relevant to investments that should have been, but were not, included in the draft Carbon Plan: higher energy intensities, which result in higher energy bills, strongly correlate with poor housing quality and low energy efficiency.

2. **Winter Impact and Heat Source (and Summer Impact):** the Companies' LIAC analytics concluded as follows:

   > higher differences between average monthly usage in [both] winter [and summer] months and the overall annual average monthly usage result in a greater likelihood of meeting the arrears model definition. Compared to the baseline, all-electric homes using 1,000 kWh more electricity per month in winter are 53% more likely to meet the arrears model definition, while those using 1,500 kWh more are 87% more likely and at 2,000 kWh more are 129% more likely. Households that use non-electric heating sources have a higher likelihood of meeting the arrears model definition, with those using 1,000 kWh more being 61% more likely and those using 1,500 kWh more being 91% more likely. In addition, because non-electric households are being compared at the same level of increased electricity usage (e.g. 1,000 kWh more on average in winter months) but are also paying for non-electric heating bills, which will add more strain on their ability to afford and pay their electric bill since heating the home would be the top priority.

   Regarding the Summer Impact, the assessment notes that:

[26] *See* Joint N.C. Low-Income Affordability Collaborative at Appendix F.

> [t]he results for summer impact reflect those for winter impact in that higher usage in summer months for cooling increases the likelihood of meeting the arrears definition. However, it is notable that the impact on the likelihood of meeting the arrears definition is substantially smaller in the Summer Impact category than in the Winter Impact category at the same variance level (e.g. 1,000 kWh).

3. **Electric bill burden**: Electric bill burden is defined as the percent of gross household income spent on electric bills. The results of the LIAC analysis showed that:

> a higher electric bill burden corresponds to a higher likelihood of meeting Duke Energy's arrears model definition. At an 8% electric burden a household is 19% more likely to meet the arrears definition, 36% more likely with a 10% electric burden, and 52% more likely with a 12% electric burden. Conversely, lower electric burdens were associated with households being less likely to meet the arrears model definition: 20% less likely with a 4% electric burden and 44% less likely at a 2% electric burden. This result strongly suggests that lowering a household's electric burden below the 6% threshold can have a significant impact on electric bill affordability for low-income households.[27]

The results described above detail how different factors affect the degree to which households are at risk of meeting the Companies' arrears definition. However, the same factors also strongly contribute to the ultimate affordability impact—being disconnected for non-payment. As such, each of these results highlight the significant detrimental impact that inefficient housing and high electric bills have on households served by Duke Energy, particularly low-income households.

Bill assistance and arrearage management programs are designed to prevent, or at least alleviate, the risk of a household falling into arrears and/or being disconnected from electric service. The same holds true for distributed energy resource ("DER") options and investments that are accessible to low-income or otherwise "arrears struggling" households. However, as the LIAC analysis makes clear, a major underlying factor contributing to arrears—and ultimately disconnections—is inefficient housing and appliances. As stated in the Assessment, "the results . . . strongly suggest that improving a household's energy efficiency through air sealing, insulation, and energy efficient heating systems could substantially reduce a household's likelihood of experiencing a [disconnection for non-payment]."[27]

[27] *See* Joint N.C. Low-Income Affordability Collaborative at Part 2.

The Carbon Plan Must Incorporate Affordability Programs and Investments to Avoid Exacerbating Customer Affordability Impacts

In sum, while "cost" may be used to describe what Duke Energy spends on generating resources and the grid, and even what customers pay on their bills, "affordability" describes the customers' ability to pay those costs, not the dollar amounts themselves. Therefore, if the Companies claim to include and consider "affordability" in the Carbon Plan, they must first define what that means in the context of the Carbon Plan and for customer experiences with ease or difficulty of payment. The Companies must then incorporate actual programs and investments that both deal with existing affordability challenges and which enhance affordability via the Carbon Plan and its implementation. The proposed Carbon Plan does neither, and the Companies have made it clear through subsequent discovery that they are either unwilling or unable—despite their involvement in the LIAC stakeholder process over the past year—to define what affordability means beyond "least cost."[28]

Given the availability of comprehensive household-level data detailing residential customers' existing affordability challenges, and in light of the customer bill impacts of the four portfolios as modeled for the Carbon Plan, it is unconscionable that the Companies neglected to include any affordability and/or low-income targeted assistance, arrearage management, energy efficiency ("EE") or distributed energy resource ("DER") programs in the plan. Such measures could alleviate existing affordability impacts and reduce the risk of shutoffs, while also helping the state to reach its emission targets and allow low-and-moderate income customers to more proactively participate in decarbonizing the grid.

The Companies do suggest that affordability programs and investments are already integrated into the Carbon Plan. For instance, Tables B-7 and B-8 of Appendix B, which list "[o]utcomes [a]ddressed" in the Carbon Plan development and execution, respectively, both listed "[i]ncorporate recommendations from related stakeholder engagement processes, including but not limited to the Clean Energy Plan stakeholder process, the Low-Income Affordability Collaborative, and the Working Group on Climate Risk and Resilience."[29] The phrase, "outcomes addressed in development and execution" suggests that recommendations from the noted stakeholder processes would be included in the Carbon Plan as it has been proposed. However, the current proposed plan is devoid of any specific investments, policies or programs that directly address affordability for vulnerable customers.

When questioned about whether the Companies had analyzed or modeled how customer bill assistance and arrearage management programs, or low-income solar offerings, could be used to

[28] DE Response to Appalachian Voices DR. 1-10.

[29] CAROLINAS CARBON PLAN, *supra* note 1, at 15–16 Appendix B.

make Carbon Plan implementation more affordable for low-income customers, the Companies' response was again that "the Companies' Carbon Plan identifies the least-cost path to achieve the targeted carbon reductions and will therefore ensure that the Companies' rates remain affordable and below the national average. . . . Further consideration of other customer program issues are outside of the scope of this proceeding,"[30] and that "[f]uture low-income solar offerings were not specifically modeled in the Carbon Plan. However, the Company continues to evaluate new programs that will help to meet the solar needs outlined in the Carbon Plan."[31]

In other words, despite including affordability as one of the core objectives of the Carbon Plan, and despite having coordinated and participated in all aspects of the LIAC process over the past year, the Companies neglected to include any programs or investments in the Carbon Plan that actually address and alleviate existing and future affordability challenges for residential customers.

Recommendations From the Low-Income Affordability Collaborative

During the last half of the LIAC process, numerous stakeholders participating in LIAC—including Appalachian Voices—submitted, considered and/or commented on proposals for addressing low-income affordability challenges, impacts and underlying causal factors. This process generated 19 unique proposals.[32] While these recommendations were not finalized prior to the Companies' filing of the proposed Carbon Plan, they were in fact proposed nearly a month prior to the filing, and many of them had already been proposed and considered through the Companies' Energy Efficiency and Demand Side Management ("EE/DSM") Collaborative.

Regardless, while the Companies could have modeled numerous options for low-income bill assistance and EE/DSM programs as part of their EE/DSM analysis in the Carbon Plan, the Companies elected not to do so, further foregoing the inclusion of such models as investments toward achieving the Plan's objectives. Future iterations of the Carbon Plan should include and model the impacts of the LIAC's proposals, and the Companies should solicit input and feedback from LIAC participants on which programs would have the greatest impacts for both affordability and carbon reductions.

However, in the meantime, it is clear that even without including specific low-income programs in the Carbon Plan, the Companies could have, and should have, included targeted low-income

[30] DE Response to Appalachian Voices DR 1-6.
[31] DE Response to Appalachian Voices DR 1-21.
[32] Low-Income Affordability Collaborative. NC LIAC Proposal Assessment Results. The final version of the LIAC proposals and assessment results was provided by Guidehouse to LIAC participants via email on July 7, 2022. As such it was unavailable for inclusion in the NC LIAC Quarterly Report filed in Docket E-7 Sub 1214 on April 25, 2022. The results will be published in that docket as part of the joint final LIAC report being produced by Duke Energy, Guidehouse and the Public Staff on or before July 29, 2022. However, a copy of the proposal assessment results may be provided upon request.

EE/DSM and DER investments and programs in the Plan and modeled the benefits and impacts of such programs for each of the four portfolios.

Reducing Low-Income Energy Burdens Through Investments in Energy Efficiency, Community Solar and Demand Response

Since such modeling was not included in the proposed plan, Appalachian Voices contracted with PSE Health Energy to analyze the potential for reducing household energy cost burdens through targeted low-income investments in energy efficiency, community solar and demand response, as well as the long-term savings on bill assistance that would result from sustained investments in such programs. The analysis was included in PSE Healthy Energy's report "Review and Comments on Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's 2022 Proposed Carbon Plan," which has also been submitted as an Appendix to our comments in the docket.

The following are some key findings from that analysis. We again recommend reviewing the full report for more detail on the analysis and results:

- The vast majority of households with energy cost burdens greater than 9% will have seen their burden reduced to less than nine percent and nearly all households between one and two times the FPL will have energy cost burdens less than the 6% threshold.
- The total energy affordability gap is reduced from $630 million to $237 million after the investment in efficiency, then to $70 million after community solar is introduced, and finally down to $30 million after demand response is implemented.
- Each of these investments also provides co-benefits in terms of carbon reduction and demand reduction. For example, efficiency investments in low-and-moderate income households alone could reduce annual energy demand by roughly 2,800 GWh.[33]

Wholesale Markets and Performance-Based Regulation Should Be Modeled in the Carbon Plan for Cost-Saving and Carbon-Reducing Potential

[A] number of stakeholders requested that Duke Energy include in Carbon Plan modeling the impacts of joining a regional transmission organization ("RTO"). In response to this recommendation, the Companies explained to stakeholders that wholesale power market constructs, like RTOs, are overseen and regulated by FERC and such alternative market structures are beyond the scope of the Carbon Plan directed by HB 951. The Companies explained that fundamentally changing the wholesale power market construct that exists in North Carolina

[33] PSE Report at 18.

would be a decision for the General Assembly and not a reasonable or practical assumption for the Companies to include in its Carbon Plan modeling.[34]

While it may be true that HB 951 restricted most new generating resources resulting from Carbon Plan implementation to being owned by Duke Energy, "least cost" principles, as well as affordability objectives, would support modeling of how competitive wholesale markets may (or may not) achieve the Carbon Plan objectives and targets at a lower cost than adopting a majority utility-owned and operated approach.

Indeed, recent independent analysis of the benefits of decarbonizing through a Southeast RTO, a regional competitive wholesale market, indicate that such an approach could save ratepayers hundreds of billions of dollars region-wide by 2040 compared to a business-as-usual case. The study, conducted by Energy Innovation and Vibrant Clean Energy, found that:

> The effects of a single restructured wholesale market in the Southeast are dramatic and immediate. In 2025, the year in which the model has fully operationalized the competitive electricity market, the RTO Scenario is approximately $13 billion cheaper in operations and amortized capital costs. By 2040, the cumulative savings of the RTO Scenario is approximately $384 billion, as expensive-to-run coal and gas fired power plants are replaced with more competitive wind, solar, and battery storage.[35]

Additionally, the groups modeled the relative carbon impacts between the BAU and RTO scenarios, finding that the Southeast RTO approach reduces carbon emissions by 46% below the Southeast BAU scenario in 2040. The study also notes that:

> Both Duke Energy and Southern Company have pledged to achieve net-zero company emissions by 2050, an aspirational goal in line with the goals of the Paris Agreement target to keep global warming below 1.5° Celsius. Yet the modeling makes clear that Southern and Duke's IRPs are off track from what's needed to achieve these goals. Combined, Duke Energy and Southern Company make up approximately 45 percent of total Southeast retail sales. In fact, a competitive market with no carbon policy does a better job of reducing emissions than Duke and Southern's efforts. This reveals two dynamics: First, vertically integrated utilities' incentives to maintain and earn on existing infrastructure conflicts with both customer well-being and environmental goals. Second, regional transmission and operational approaches are more effective at integrating high shares of renewable electricity, and Duke and Southern hamper their own efforts to decarbonize at least cost by resisting regionalization efforts.[36]

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[34] CAROLINAS CARBON PLAN, *supra* note 1, at 13 Appendix B.

[35] ERIC GIMON ET AL., SUMMARY REPORT: ECONOMIC AND CLEAN ENERGY BENEFITS OF ESTABLISHING A SOUTHEAST U.S. COMPETITIVE WHOLESALE ELECTRICITY MARKET 9 (Energy Innovation and Vibrant Clean Energy, Aug. 2020), https://energyinnovation.org/wp-content/uploads/2020/08/Economic-And-Clean-Energy-Benefits-Of-Establishing-A-Southeast-U.S.-Competitive-Wholesale-Electricity-Market_FINAL.pdf.

[36] *Id.* at 12.

In other words, if Duke Energy is truly committed to decarbonizing the grid in the Carolinas, rapidly and at least cost, it would behoove the company to, at a minimum, work with independent analysts to model how a regional wholesale market approach may be able to achieve the company's and the state's goals faster and cheaper than the Company's preferred "own (almost) everything" approach. The Commission might also consider conducting its own such modeling, if only as a reference against which to compare the costs and benefits of the two possible approaches.

As for performance-based regulation ("PBR"), the Clean Energy Plan stakeholder process and subsequent North Carolina Energy Regulatory Process that came out of Governor Cooper's Executive Order 80 resulted in a consensus report on the development of a PBR regulatory and ratemaking framework. As noted by the Companies in the proposed Carbon Plan:

> The PBR Study Group Work Product recommended the adoption of three ratemaking tools: (1) residential decoupling, (2) performance incentive mechanisms ("PIMs"), and (3) multiyear rate plans ("MYRP") with an earning sharing mechanism ("ESM"). The basic framework for PBR legislation that was recommended by the North Carolina Energy Regulatory Process (NERP) was ultimately enacted, with modifications, in HB 951. All three recommended PBR components were ultimately included in HB 951.[37]

While that statement is generally true, in that HB 951 included the noted components, the details of the framework that were written into enacting legislation do not reflect the stakeholder consensus that was achieved through the NERP process. One of the more glaring shortfalls in the legislation was the lack of any requirement for the Companies to select specific PIMs that would achieve the very objectives the Companies claim as their core objectives for the Carbon Plan, notably "affordability," "carbon reduction," or "reliability" PIMs. Instead, the legislation only authorizes the Commission to "consider" whether a PBR application achieves one or more of the following policy objectives:

1. Encourages peak load reduction or efficient use of the system.
2. Encourages utility-scale renewable energy and storage. Encourages DERs.
3. Reduces low-income energy burdens.
4. Encourages energy efficiency.
5. Encourages carbon reductions.
6. Encourages beneficial electrification, including electric vehicles. h. Supports equity in contracting.
7. Promotes resilience and security of the electric grid.
8. Maintains adequate levels of reliability and customer service.
9. Promotes rate designs that yield peak load reduction or beneficial load-shaping.[38]

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[37] CAROLINAS CARBON PLAN, *supra* note 1, at 18 Appendix B.

[38] 2021-165 N.C. Sess. Law 7.

That list largely reflects the PIMs objectives identified by NERP stakeholders.[39] Unfortunately, the legislation did not require that the Companies include PIMs targeting any of those objectives in their PBR application. Further, the legislation allows the Companies to select "one or more" PIMs, effectively allowing the Companies to select only a "reliability" PIM if they so choose.

Regardless, were the Companies to recognize and model the benefits of selecting multiple PIMs that advance the goals of the Carbon Plan, which most or all of the objectives listed above do, and include such modeling in the Carbon Plan itself, it is reasonably expected that the overall cost of implementing the plan would be lower than what the Companies have estimated. Further, it is reasonably expected that emissions reductions could be achieved in a shorter time frame, and that customer affordability would be enhanced as a result of Carbon Plan implementation rather than negatively impacted. To that end, we recommend that future iterations of the Carbon Plan include a modeling of stakeholder-determined PIMs, especially of PIMs that alleviate affordability challenges for low-income customers.

Recommendations for the Commission

Pursuant to the findings of this report, we recommend that the Commission:

1. Require that the Companies define and develop metrics for assessing "affordability" in a manner that describes actual experiences and impacts faced by its residential customers. To this end we recommend that the Commission consider requiring that the Companies consider adopting the definition of affordability codified by the California Public Utilities Commission and proposed during the Low-Income Affordability Collaborative Sub-team B work process, which is "the degree to which a representative household is able to pay for an essential utility service charge, given its socioeconomic status."
2. Require that the Companies revise the proposed Carbon Plan to incorporate and model the affordability and carbon reduction benefits of customer bill assistance and arrearage management programs (such as those proposed through the Low-Income Affordability Collaborative), low-income weatherization and other energy efficiency investments, and low-income distributed energy and demand reduction investments. The Commission should require the analysis to include impacts on low-income customer bills, electricity cost burdens, arrearages, disconnections for non-payment, and carbon emissions via the avoidance of the "need" to build new methane gas generation.
3. Require the Companies to model, as a sensitivity analysis, how a regional competitive wholesale market and legislatively approved, performance-based regulation would impact resource selection and portfolio costs for the Carbon Plan, and by extension, carbon emissions and customer affordability.

[39] PERFORMANCE BASED REGULATION: STUDY GROUP WORK PRODUCTS (N.C. Energy Regul. Process, Dec. 2020), https://deq.nc.gov/media/17684/download.

VERIFICATION

Pursuant to the Commission's *Order Establishing Additional Procedures and Requiring Issues Report* entered on April 1, 2022 in the above-referenced docket, I, Rory McIlmoil, hereby verify that the contents of the foregoing Report are true to the best of my knowledge and belief, except as to those matters stated on information and belief, and as to those matters, I believe them to be true.

This the 15 day of July, 2022.

Rory McIlmoil

Sworn to and subscribed before me this the 15th day of July, 2022.

Notary Public

November 30, 2024
My commission expires:

AMY C. DILLS
NOTARY
PUBLIC
HENDERSON COUNTY, NC

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Profile

Mr. McIlmoil has a background in environmental science and policy with a focus on the analysis and presentation of scientific and economic data relevant to environmental policy and energy development. He has thirteen years of experience working on energy and economic policy issues in Appalachia and the Southeast. For most of the past nine years, Mr. McIlmoil has been advocating for, and supporting the development of inclusive on-bill energy efficiency finance programs through rural electric cooperatives in North Carolina and Tennessee. His current areas of focus include utility regulation and rate/regulatory reform, electricity markets, and utility, programmatic and policy solutions for addressing low-income energy affordability.

Relevant Experience

Serving as a sub-team co-lead for the Low-Income Affordability Collaborative coordinated by Duke Energy and Guidehouse, which included drafting the "Assessment of Customer Challenges Related to Affordability."

Analyzing and communicating to the public, media and policy makers the provisions and cost impacts of NC House Bill 951, a major energy bill drafted by Duke Energy, favorable House Republicans and a handful of representative stakeholders.

Analyzing and publicizing data on residential utility disconnections and arrearages in North Carolina that have resulted from COVID-19, and working in collaboration with racial, economic and environmental justice partners to advocate for policy and funding solutions to alleviate the crisis of unaffordable utility bills and pressuring NC Governor Roy Cooper to extend related moratoria primarily to address racial and social inequities.

As an adjunct professor at Appalachian State University (Fall 2020 through Spring 2021), creating and teaching the first undergraduate Energy Policy curriculum that has ever been provided at the university.

Serving as a lead researcher and facilitator for the "Energy Insecurity in the Southeast" project, led by the Nicholas Institute at Duke University in partnership with Appalachian Voices and the North Carolina Justice Center.

Participation in the North Carolina Clean Energy Plan "Recommendation B-1" working group helping to develop a policy proposal for the adoption of performance-based regulation for regulated electric utilities in North Carolina.

As an expert witness in the Duke Energy Carolinas 2019 rate case, analyzing and providing testimony on the impact on electricity bills and household energy burdens for low-income residents resulting from proposed and Commission-approved changes in Duke Energy Carolinas' electricity rates.

Combining utility data on energy use and county property tax data to identify the seasonal and average household energy intensity of individual households to assist Appalachian Electric Cooperative in identifying priority targets for its "U-SAVE Advantage" inclusive on-bill energy efficiency finance program.

Supporting policy and technical work for an emerging bi-partisan effort to restructure Virginia's electricity market and eliminate monopoly electric utilities.

Leading voice and researcher for the advancement of an Energy Efficiency Resource Standard through the Duke University Nicholas School for the Environment "Energy Efficiency Roadmap" project for North Carolina.

Assessing and advocating for appropriate electric utility rate structures that protect low-income residents and facilitate end-user energy efficiency and renewable energy investments.

Leading efforts to promote and help develop "inclusive" on-bill finance home energy efficiency finance programs through rural electric cooperatives in Appalachian North Carolina and Tennessee.

Leading collaborative efforts on issues related to rural electric cooperatives through the Advancing Equity and Opportunity in the Southeast Collaborative and the North Carolina On-Bill Working Group.

Conducting research and analysis of the influences on demand for Central Appalachian coal and the impacts of changes in demand on local economies across the region.

Analyzing the fiscal impact of coal-related activities for the states of West Virginia, Virginia, Tennessee, and Pennsylvania.

Characterizing distributed energy potential for Kentucky and associated economic and environmental benefits.

Projecting future economic investment that would result from a permanent mineral trust fund in West Virginia.

Education

M.A., Global Environmental Policy, American University, Washington, D.C., 2007.

B.S., Earth & Environmental Sciences, Furman University, Greenville, South Carolina, 2002.

Select Publications/Reports

McIlmoil. 2019. Monopoly Money Part 2: How Campaign Donations Influenced the Senate Vote on Duke Energy's Rate Bill. Appalachian Voices and the Energy Justice for NC Coalition.

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Representative Presentations

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Jefferson County (TN) "GIS Day." 2019. New Market, TN. "Using GIS and Data Analysis to Enhance Energy Efficiency Investments and Program Uptake for Appalachian Electric Cooperative."

ACEEE Rural Energy Conference. 2018. Atlanta, GA. "Identifying Priority Households for Pay-As-You-Save® Energy Efficiency Investments in East Tennessee."

Appalachian State University, Socioeconomic Forum. 2018. Boone, NC. "Energy Efficiency as a Public Need: Addressing Energy Waste to Alleviate Poverty, Improve Public Health, and Grow Local Economies."

Tennessee Renewable Energy and Economic Development Council, Annual Conference. 2017. Cookeville, TN. "Equity in Energy Efficiency Investments."

North Carolina State Energy Conference. 2016. Raleigh, NC. "Energy Access in Hard-to-Reach Markets: Using On-Bill Programs for Energy Efficiency Investment."

Appalachian State University, Appalachian Energy Center CLE Course, Presenter. Boone, NC. 2015. "Emerging Financial Models and Policy Structures Supporting Renewables and Energy Efficiency."

National Governor's Association, Tennessee Energy Efficiency Retreat. 2014. Nashville, TN. "Program Options and Considerations for Electric Cooperative On-Bill Energy Efficiency Finance Programs in Tennessee."

Tennessee Electric Cooperative Association, Quarterly Managers Meeting. 2013. Nashville, TN. "On-Bill Financing for Residential Energy Efficiency in Tennessee."