

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-100, SUB 157

In the Matter of: ) INITIAL COMMENTS OF  
2018 Biennial Integrated Resource ) SOUTHERN ALLIANCE FOR CLEAN  
Plans and Related 2018 REPS ) ENERGY, SIERRA CLUB, AND  
Compliance Plans ) NATURAL RESOURCES DEFENSE  
COUNCIL

Intervenors Southern Alliance for Clean Energy, the Sierra Club, and the Natural Resources Defense Council (collectively, “Intervenors”) respectfully submit the following initial comments on the 2018 Integrated Resource Plans (“IRPs”) of Duke Energy Carolinas, LLC (“DEC”) and Duke Energy Progress, Inc. (“DEP”) (collectively, “Duke Energy” or “Duke”).

In the comments that follow, Intervenors offer an overview of several key issues arising from the 2018 Duke IRPs. Intervenors ask that the Commission review the 2018 DEC and DEP IRPs carefully, consider these comments and those of other intervenors and the Public Staff, reject the 2018 Duke IRPs as noncompliant with state law and not reasonable for planning purposes, and require the Companies to correct any deficiencies identified by the Commission in light of these comments. If the Commission requires further information to make that determination, Intervenors request that the Commission convene an evidentiary hearing on the 2018 IRPs and hear expert testimony on the issues identified in these comments.

**SUMMARY**

Intervenors commissioned expert analyses of the 2018 Duke IRPs and supporting documents, as discussed in detail in the reports attached to these comments. Using

Duke's own data, these expert consulting firms—the Applied Economics Clinic, ICF International, and Wilson Energy Economics—reached the following conclusions:

***Duke Energy could save customers money and develop a more flexible, low-risk system with greater reliance on cleaner energy resources:***

- A resource portfolio with higher levels of energy efficiency, solar, and wind could save ratepayers billions of dollars over the planning horizon with the added benefit of reduced air pollution from gas- and coal-fired power plants.
- Duke should evaluate the economic and reliability implications of accelerated retirement of coal plants, rather than simply planning to retire them at the end of their depreciation book life.
- The Companies' forecasts for winter peak loads should be carefully scrutinized to ensure that they are not unduly driven by rare, extreme weather events (such as the Polar Vortex).
- The reserve margins used in the 2018 IRPs were improperly inflated, and the shift by DEC and DEP to planning for “winter-peaking” systems should be carefully scrutinized.
- Energy efficiency and solar are cost-effective. Higher levels of energy efficiency, wind, and solar could avoid or defer the need for new gas-fired power plants and enable accelerated retirement of coal units. Yet Duke inappropriately limited the amounts of energy efficiency, solar, and wind by imposing artificial constraints and disregarding the potential for these resources.

***However, Duke's 2018 IRPs do include some steps in the right direction:***

- The DEC and DEP IRPs include deployment of more grid-connected battery storage, which will support addition of solar and other clean energy resources on their system as well as providing a new resource for balancing grid supply and demand, a new tool for peak shaving, and other benefits.

## DISCUSSION

### **A. The 2018 Duke IRPs do not meet North Carolina IRP requirements.**

The crucial question before the Commission with respect to the 2018 Duke IRPs is whether they result in the least-cost mix of demand- and supply-side resources, as

required by North Carolina law. The 2018 Duke IRPs also must be considered in light of North Carolina policy goals, including Governor Roy Cooper’s Executive Order 80, which puts our State on a path toward a carbon-constrained future.

As summarized in these comments and as explained in detail in the attached expert reports, the 2018 Duke IRPs do not represent the “least-cost mix” of resource options. The resource mix in the 2018 IRPs is more costly, more risky and more polluting than a plan that relies on reasonable reserve margins, retires aging coal plants based on economics, and maximizes cost-effective energy efficiency, renewable energy resources, and battery storage.

**B. Economically optimized modeling of the North Carolina power sector delivers cost savings and pollution reductions compared to Duke Energy’s IRPs.**

Intervenor Natural Resources Defense Council (NRDC) commissioned the energy consulting firm ICF to perform a power sector analysis using ICF’s Integrated Planning Model (IPM<sup>®</sup>), a power sector dispatch model. Power sector dispatch modeling helps utilities, regulators, and stakeholders understand the costs and benefits of different policy and power portfolios at state, regional, and national levels. In its IPM analysis, ICF used assumptions developed by NRDC based on publicly available forecasts and data sources. A summary of the ICF analysis is included as Attachment 1 to these comments.

ICF’s IPM analysis shows that greater reliance on cleaner energy sources, rather than fossil fuel generation, delivers major cost savings and deep pollution reductions for North Carolina compared to the “business-as-usual” approach in the Duke IRPs. The key findings from ICF’s IPM analysis are as follows:

- Under the “economically optimized” case, which allowed the model to optimize for a least-cost outcome by retiring and adding new resources:
  - The state sees a significant reduction in coal capacity in the near term, from 10.5 gigawatts (“GW”) to 6.5 GW.
  - Reduced coal capacity and generation is replaced primarily by new solar—in total, 11.7 GW of utility-scale solar is operating in the state by 2025.
  - The only gas capacity added to the system is from units already under construction—no new gas capacity was selected by the model based on economics.
  - Renewable energy generation more than makes up for the generation reductions from other sources without impacting total in-state generation.
  - The shift away from coal and toward zero-emission resources leads to significant emission reductions: between 2018 and 2020, emissions fall by 15% to 45.7 million short tons. If North Carolina were to follow this economically optimized path, electric sector carbon emissions would fall to 41% below 2005 levels by 2025.
- Under the IRP case, which was designed to more closely match the long-term resource plans submitted by DEP and DEC in this docket:
  - The electric sector depends much more heavily on natural gas than under the economically optimized scenario, with new gas plants crowding out economic investments in solar and storage.
  - The state sees more carbon pollution—2.4 million more tons annually—over the next two decades, compared to the economically optimized case.

- The state's energy system is much more expensive, and the average residential customer would see higher bills. The total system cost under the IRP case comes in at \$5.6 billion more than under the economically optimized case. Translated to the bill impact for the average residential customer, the IRP case results in bills that are 3% higher than in the economically optimized case by 2030, and about 5% higher than in the optimized case by 2035.

IPM is a national model—not a model of the DEC and DEP systems—but NRDC's IPM analysis focuses on the state-level results for North Carolina, and therefore provides important and useful insights for the Commission and the parties to this proceeding.

**C. Duke should evaluate accelerated retirement of coal plants.**

Intervenors have previously identified Duke Energy's failure to use its extensive modeling resources to fairly evaluate the cost-effectiveness of coal retirements. Yet Duke continues to determine the timing and amount of coal retirements based not on economics, but based on the depreciation book life of the coal plants. This approach, left unchecked, will continue to be too costly to ratepayers.

In developing the 2018 IRPs, the Companies used a flawed and incomplete analysis of their existing coal fleet, as discussed in detail in the attached report by the Applied Economics Clinic (Attachment 2).<sup>1</sup> As explained in Applied Economics Clinic Report, the Companies have not performed a full economic comparison of existing and new resources. Instead, DEC and DEP have hard-wired the projected lifespans of their

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<sup>1</sup> Tyler Comings, et al., *Review of Duke Energy's North Carolina Coal Fleet in the 2018 Integrated Resource Plans* (March 7, 2019), Attachment 2.

existing coal units, preventing a fair comparison of the economics of these units relative to what should be considered as competing resources. This methodology inhibits the pursuit of potentially lower-cost options. While the Companies' modeling analysis was limited (and deemed confidential by the Companies), the Companies disclose in the public versions of their IRPs that many of their coal units will serve as "peaking" plants, continuing a trend of running at very low capacity factors. Given the high fixed costs of keeping coal units online, it is highly unlikely that continued reliance on aging coal plants is a cost-effective strategy for North Carolina ratepayers. Ratepayers should not be asked to blindly accept the uneconomic continued use of coal-fired power plants given the existence of lower-cost alternatives.

DEC and DEP should study continued investment in their aging coal units in comparison to unit retirement and replacement. This analysis of coal unit economics should be transparent and involve stakeholders, preferably throughout the decision-making process. The IRP process is the right time for the Companies to evaluate the future of their units, and this proceeding presents a prime opportunity for the Commission to review that evaluation.

**D. Duke should refine its load forecasting methodology.**

The load forecast is a major factor determining a utility's need for new resources to meet system energy and demand. Overstating load growth will result in excess capacity on the system, and excess costs borne by ratepayers. Over the 15-year planning horizon, DEC forecasts an annual average growth rate of 1.0% (summer) and 0.9% (winter) with energy growth of 0.8%. DEP forecasts an annual average growth rate of 0.8% (summer) and 0.7% (winter) with energy growth of 0.5%.

While Mr. Wilson found that the Duke load forecasts appear more reasonable than in the past, they should be carefully examined. Moreover, it is too soon to draw a conclusion about the Companies' winter peak load forecasts, because the instances of loads exceeding the forecasts have generally occurred under very unusual extreme cold events (such as "Polar Vortex" events). The Companies should further research the drivers of sharp load spikes under extreme winter cold conditions, and develop demand response programs and other strategies for shifting load or shaving these spikes. In addition, DEC and DEP should develop a more sophisticated model of how extreme winter weather affects their loads. The Companies' load forecasts are reviewed in detail in the attached report by Wilson Energy Economics (Attachment 3), which provides additional recommendations.<sup>2</sup>

**E. The reserve margins used in the 2018 IRPs were improperly inflated.**

The planning reserve margin is a key element of an IRP because it determines how much extra capacity the utility maintains on its system to meet demand in the event of an outage or other unanticipated capacity gap. Both of the Duke 2018 IRPs use a 17% winter planning reserve margin, an increase relative to the 16% reserve margins used before the 2016 IRPs. These planning reserve margins used in developing the IRPs were, in turn, based on resource adequacy studies conducted by Astrapé Consulting in 2016 ("2016 RA Studies"). Due to a number of flaws in the 2016 RA Studies, the DEC and DEP planning reserve margins are improperly inflated, and the increase to 17% should be rejected.

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<sup>2</sup> James F. Wilson, *Review and Evaluation of the Load Forecasts for the Duke Energy Carolinas and Duke Energy Progress 2018 Integrated Resource Plans* (March 7, 2019), Attachment 3.

The 2016 RA Studies exaggerated the risk and magnitude of extreme winter peak loads, calling into question the shift by DEC and DEP to planning for “winter-peaking” systems. The RA Studies also substantially overstated the risk of very high loads under extreme cold, mainly due to a faulty approach to extrapolating the increase in load due to very low temperatures. In addition, due to the RA Studies’ assumptions about demand response capacity and operating reserves applicable to winter peak conditions, the resource adequacy risk in winter was substantially overstated relative to the risk in summer and other periods of the year. The use of overly high reserve margins in the IRPs means that DEC and DEP are planning to add too much new capacity on the system, which would add unnecessary costs for ratepayers. These findings, along with corresponding recommendations for improvement, are discussed in detail in the Wilson Energy Economics report attached as Attachment 4 (the “Wilson Resource Adequacy Report”).<sup>3</sup>

**F. Duke’s IRPs undervalue and under-project solar resources.**

1. Duke undervalues the capacity that solar provides to the DEC and DEP systems.

The Duke utilities plan to increase the amount of solar on their systems by over 3,600 MW over the planning horizon. Duke grossly undervalues the capacity value that solar provides, however, which diminishes the planned deployment of solar resources over the planning horizon. The capacity values for solar resources were based on an Astrapé report that employs the same model and many of the same assumptions that were

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<sup>3</sup> James F. Wilson, *Review and Evaluation of Resource Adequacy and Solar Capacity Value Issues with regard to the Duke Energy Carolinas and Duke Energy Progress 2018 Integrated Resource Plans and Avoided Cost Filing* (February 12, 2019), Attachment 4.



used in the 2016 RA Studies.<sup>4</sup> Duke’s data and its method for calculating solar capacity values were severely flawed, however, resulting in a dramatic undervaluing of solar’s capacity benefit to the DEC and DEP systems. These flawed assumptions, and recommended corrections, are discussed in detail in the Wilson Resource Adequacy Report (Attachment 2).

Duke’s projections also fail to account for likely improvements in solar technology and are on the low end of what has been observed from projects that have been put in service in recent years.<sup>5</sup> For example, DEP projects summer solar PV capacity values of 8.2 to 12.4 percent (DEP IRP, p. 42), far lower than the weighted average of 27.6 percent observed in projects installed nationally over the last ten years.

2. Duke should reevaluate its projections for addition of new solar resources.

Duke Energy Progress projects that it will add 1,441 MW of solar to its system over the next 15 years, but anticipates that the bulk of that growth—approximately 1,000 MW—would occur in the next five years, coincident with its solar procurement obligations under House Bill 589. After increasing by roughly 36 percent in the first five years (from 2019 to 2023), solar on the DEP system would increase by only another 11.6 percent over the following 10 years (from 2023 to 2033). DEP IRP, p. 27.

DEC’s 2018 IRP suffers from the same limited vision. DEC plans to more than double the installed solar on its system in the first five years (2019-2023), from 1,218

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<sup>4</sup> *Duke Energy Carolinas and Duke Energy Progress Solar Capacity Value Study*, August 27, 2018 (“Capacity Value Study”), produced in response to SACE/NRDC/Sierra Club Data Request 1-28 in NCUC Docket E-100, Sub 157.

<sup>5</sup> “The capacity factors of individual [utility-scale solar PV] projects in this sample range widely, from 14.3% to 35.2%, with a sample mean of 26.0%, a median of 26.3%, and a capacity-weighted average of 27.6%.” Mark Bolinger, et al, *Utility-Scale Solar: Empirical Trends in Project Technology, Cost, Performance, and PPA Pricing in the United States*, Lawrence Berkeley National Laboratory (Sept. 2018), at p. 23 ([https://emp.lbl.gov/sites/default/files/lbnl\\_utility\\_scale\\_solar\\_2018\\_edition\\_report.pdf](https://emp.lbl.gov/sites/default/files/lbnl_utility_scale_solar_2018_edition_report.pdf)).

MW to 2,532 MW. After that, however, solar additions would grow at a much slower rate: DEC anticipates adding about 262 MW per year in the first five years of its planning horizon, slowing down to about 90 MW per year in the last ten years. DEC IRP, p. 31.

These projections do not reflect the recent trends in accelerated solar installations in the Carolinas nor the continuing and steep cost declines for solar. Nor is it reasonable for Duke Energy to plan for such minor, incremental investments in what is proving to be the least-cost generating resource. Duke Energy should reevaluate its projections for future solar installations using more realistic assessments of current and likely future cost declines and improved panel efficiencies.

### 3. The Companies should fairly evaluate solar-plus-storage resources.

While Duke Energy recognizes the declining cost of battery storage and has taken the positive step of including battery storage in its resource plans, the 2018 DEC and DEP IRPs still include only token amounts of this valuable resource. Greater additions of grid-connected battery storage will support addition of solar and other clean energy resources on the DEC and DEP systems, as well as providing a new resource for balancing grid supply and demand, a new tool for peak shaving, and other benefits.

Across the country, costs of solar-plus-storage technologies have fallen steadily, making those systems cost-effective—and even least-cost, in some applications. In just one example, Xcel Energy Colorado’s solicitation set records this year after attracting 87 solar-plus-storage bids for 59 projects,<sup>6</sup> with the selected projects coming in at only

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<sup>6</sup> Greentech Media, “Xcel Attracts ‘Unprecedented’ Low Prices for Solar and Wind Paired With Storage,” Jan. 8, 2018, <https://www.greentechmedia.com/articles/read/record-low-solar-plus-storage-price-in-xcel-solicitation#gs.9tluqYMo>.

\$0.030 to \$0.032/kwh.<sup>7</sup> These projects, in combination with other selected clean energy projects, will save Xcel Energy's ratepayers between \$213 and \$374 million.<sup>8</sup>

Contracted and demonstrated prices for battery storage are already least-cost compared with traditional fossil fuels in some applications<sup>9</sup> and are expected to continue to fall with decreasing battery costs and new technologies.<sup>10</sup> The amount of storage deployed alongside solar generation has increased almost ten-fold globally from 2017 to 2018, with the United States leading the build-out.<sup>11</sup> Given North Carolina's position as a national leader in solar deployment, ranking second behind California, and the growing installed solar capacity in South Carolina,<sup>12</sup> Duke should incorporate higher levels of this important resource into its long-term plans.

**G. The Duke IRPs underutilize cost-effective demand-side management and energy efficiency.**

Demand-side management ("DSM")<sup>13</sup> and energy efficiency ("EE") should be evaluated on a level playing field with supply-side resources. This may be done by

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<sup>7</sup> Greentech Media, "Xcel to Replace 2 Colorado Coal Units with Renewables and Storage," Aug. 29, 2018, <https://www.greentechmedia.com/articles/read/xcel-retire-coal-renewable-energy-storage#gs.K1DLfQtQ>.

<sup>8</sup> *Id.*

<sup>9</sup> Utility Dive, "Study: Natural gas, wind, solar cheapest power generation," Oct. 29, 2018, <https://www.utilitydive.com/news/study-natural-gas-wind-solar-cheapest-power-generation/540803/>; Utility Dive, "Wind and solar costs continue to drop below fossil fuels. What barriers remain for a low-carbon grid?," Mar. 21, 2018, <https://www.utilitydive.com/news/wind-and-solar-costs-continue-to-drop-below-fossil-fuels-what-barriers-rem/519671/>.

<sup>10</sup> Greentech Media, "6 Charts Showing the Renewables Threat to Natural Gas," Sept. 20, 2018, <https://www.greentechmedia.com/articles/read/6-charts-showing-the-renewables-threat-to-gas#gs.LBjhwyLH>.

<sup>11</sup> *Id.*

<sup>12</sup> IRP at 22.

<sup>13</sup> Under North Carolina statutes and Commission rules, "demand-side management" (or "DSM") refers to what is more commonly known as demand response in other jurisdictions, which typically use DSM as a broader term that encompasses both demand response and energy efficiency.

allowing the planning models to “select” DSM or EE as a resource, or by modeling varying levels of efficiency without screening out a subset of efficiency potential based on flawed assumptions. In developing the 2018 IRPs, Duke artificially limited the amounts of energy efficiency available as a resource to DEP and DEC through an overly restrictive screening process. Screening out demand-side options prior to running the resource planning models biases the analysis in favor of supply-side options. Further, Duke’s planning process does not allow energy efficiency to be easily compared with supply-side resources in a capacity expansion model. Coupled with the inappropriate constraints that Duke placed on energy efficiency potential, the DEC and DEP IRPs underutilize cost-effective energy efficiency, resulting in a higher-cost “preferred” portfolio than necessary.

For example, Duke projects significant, though declining, savings on peak from its energy efficiency and DSM portfolio in the near term, but projects those savings to rapidly drop off in the out years of the planning horizon. DEC assumes that no new DSM capacity will be added to help meet winter or summer peak demand or reserves after 2024, and projects decreasing reductions to peak from EE investments after 2027. Similarly, DEP anticipates no growth in several of its demand response programs (Energy Wise for Business, Large Curtailable Load, or CIG Demand Response) after 2024; and practically no growth in savings from EnergyWise for Home after 2022. Almost all of the limited growth in summer peak load impacts from DSM programs comes instead from Distribution System Demand Response. DEP IRP, p. 146. DEC anticipates no additional growth in load impacts from its DSM programs on summer or winter peak after 2023. DEC IRP, p. 167. None of these projections are consistent with

the Company's declaration that it "is committed to continuing to grow the amount of EE and DSM resources utilized to meet customer growth." DEC IRP, p. 78. Instead, these IRPs show that EE and DSM resources remain static or shrink year after year in the 2018 IRPs.

**H. Duke's 2018 IRPs rely excessively on new gas generating capacity.**

Both DEC's and DEP's 2018 IRPs feature a heavy reliance on new gas plants. Gas generation is subject to numerous uncertainties, such as fuel cost volatility, potential supply disruptions, and carbon regulation. As more energy efficiency programs and renewable energy resources and battery storage are added to the Companies' resource mix, the need for additional gas-fired capacity—and the associated risks and costs—is diminished or delayed.

### CONCLUSION

While the IRPs are planning documents, they have implications for important decisions that will face the Commission in the future. For example, the IRP is the basis for a utility's decision to build or acquire a new generating resource, and typically serves as the basis for application for a certificate to build a new power plant. Assumptions and conclusions made in the IRPs also underpin utility calculations of avoided costs, which themselves have implications for rates paid to independent power producers and for cost-effectiveness testing of DSM/EE programs. And most fundamentally, the IRP is the place where each utility discloses the cost of each portfolio—costs that will ultimately be borne by ratepayers.

Intervenors ask that the Commission review the 2018 DEC and DEP IRPs carefully, consider these comments and those of other intervenors and the Public Staff,

and reject the 2018 Duke IRPs as noncompliant with state law and not reasonable for planning purposes, and require the Companies to correct any deficiencies identified by the Commission in light of these comments. If the Commission requires further information to make that determination, Intervenors request that the Commission convene an evidentiary hearing on the 2018 IRPs and hear expert testimony on the issues identified in these comments—before Duke Energy goes farther down the path toward imprudent investments in expensive, unnecessary gas-fired generation.

Respectfully submitted this 7th day of March, 2019.

s/ Gudrun Thompson

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CERTIFICATE OF SERVICE

I certify that a copy of the foregoing Initial Comments of Southern Alliance for Clean Energy, Sierra Club, and Natural Resources Defense Council as filed today in Docket No. E-100, Sub 157 has been served on all parties of record by electronic mail or by deposit in the U.S. Mail, first-class, postage prepaid.

This 7th day of March, 2019.

s/ Gudrun Thompson