STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-7, SUB 1146

In the Matter of	
Application of Duke Energy Carolinas,	)
LLC, for Adjustment of Rates and Charges	)
Applicable to Electric Utility Service in	)
North Carolina	)

TESTIMONY OF KURT G. STRUNK

ON BEHALF OF
APPLE INC., FACEBOOK, INC. AND GOOGLE LLC
(THE "TECH CUSTOMERS")

January 23, 2018

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I. QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is Kurt G. Strunk. I am a Director of National Economic Research Associates ("NERA"). My business address is 1166 Avenue of the Americas, New York, NY 10036.

Q. PLEASE SUMMARIZE YOUR PROFESSIONAL QUALIFICATIONS.

A. I have over twenty years of experience consulting to governments, regulators, and utilities on energy-related matters. My practice at NERA focuses on the strategic, regulatory, and financial issues facing electric and gas utilities as the markets in which they operate, restructure and evolve. My experience includes dozens of assignments relating to the development of the power sector in the South-Atlantic region, as well as several assignments related to North Carolina and the utilities that operate there. As a result, I am very familiar with the market, regulatory and legislative environment in which Duke Energy Carolinas, LLC ("DEC" or "Company") operates.

I routinely address regulatory policy and regulatory reform in my consulting work. My experience includes serving as an advisor to utilities, intervenors and regulators on major regulatory reform programs and regulatory innovations. I have authored articles on various energy regulatory issues, including the use of adjustment clauses. I have served as a testifying expert on the design of adjustment clauses. In addition, my work requires that I maintain a detailed knowledge of utility financial matters and regulatory policy. I have served as a testifying expert in numerous cases dealing with utility cost of capital and financial structure.

Prior to joining the Energy Practice, I was a member of NERA's Securities and Finance Practice. Exhibit KGS-1 contains a more detailed statement of my qualifications.

Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION PREVIOUSLY?

A. Yes. In 2017, I submitted testimony on behalf of the North Carolina Sustainable Energy Association in the 2016 Avoided Cost proceeding, Docket No. E-100, Sub 148.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE REGULATORY AGENCIES IN OTHER JURISDICTIONS?

A. Yes. I frequently serve as an expert in matters before state and federal regulatory commissions. I have presented expert evidence in matters before the Hawaii Public Utilities Commission, the Maryland Public Service Commission, the Massachusetts Energy Facilities Siting Board, the Nevada Public Utilities Commission, the Ohio Public Utilities Commission, the Regulatory Commission of Alaska, the Washington Utilities and Transportation Commission, as well as the Federal Energy Regulatory Commission and the National Energy Board of Canada.

II. PURPOSE OF TESTIMONY AND CONCLUSIONS

Q. PLEASE EXPLAIN THE PURPOSE OF YOUR TESTIMONY.

A. I have been asked to review the DEC rate case filing and to provide my opinions on various economic, regulatory and financial matters before this Commission. Specifically, I was asked to review:

- DEC's proposed cost recovery rider for its Power/Forward Carolinas investments, the rationale for the use of a rider, and the justification for those investments; and

- DEC's proposed cost of capital, with a specific focus on the capital structure, cost of equity, and the interrelation between the two.

My testimony comments on the testimony of DEC witnesses who address these topics and includes evidence that is intended to assist the Commission in deciding on these matters.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS.

A. I have reached the following primary conclusions.

Power/Forward

(1) DEC has not justified the use of a rider mechanism for the Power/Forward Carolinas investments. Riders can be appropriate regulatory mechanisms for certain well-defined costs when allowed for by state law. Traditionally, the utility regulatory framework employs riders for costs that are beyond the control of the utility such as fuel and purchased power. Although riders have been approved in some instances for capital investments, DEC has not provided sufficient justification to treat grid modernization investments any differently from the other infrastructure investments that comprise DEC's rate base. Consistent with these conceptual concerns, counsel for the Tech Companies advises me that the establishment of such a rider for the recovery of future capital costs outside a general rate case is not specifically authorized under current North Carolina law.

(2) DEC has not adequately differentiated between the ongoing investments it plans to make in its transmission and distribution system and the modernization investments it includes in the Power/Forward Carolinas program. Based on DEC's presentation, the attribution of costs into the grid modernization category is seemingly arbitrary.

(3) DEC's proposed use of a rider for such a large component of ongoing capital investment threatens to unbalance the regulatory process by avoiding periodic reviews of DEC's aggregate cost of

service in the general rate case process, thereby risking a significant disconnect between rates and the Company's cost of service.

(4) DEC's analysis in support of the Power/Forward Carolinas investments is flawed in several respects. First, it inappropriately makes its primary focus the indirect effects (i.e., impacts on the state-wide economy) rather than the direct effects of enhanced service reliability. Importantly, the economic impact study quantifying indirect effects does not account for the negative impact on the economy of raising rates for residential customers. Second, the analysis does not include any risk assessment, which is essential for an investment program of this scale. The Power/Forward Carolinas program is a major initiative, and the cost-effectiveness of the various types of proposed investments must be demonstrated and the risks evaluated.

(5) Given the magnitude of the rate increases sought for Power/Forward Carolinas and DEC's apparent intent to modernize the utility, consideration should be given to other ways to modernize the DEC business model. One way that could potentially yield savings for customers would be for DEC to join a larger competitive market such as the PJM Interconnection (PJM) or the Midcontinent Independent System Operator (MISO). Additional analysis is needed, and should be conducted, to assess whether such a step would be beneficial.

Cost of Capital / Rate of Return

(6) DEC's applied-for cost of capital well exceeds the level that is required under the fair return standards established in the Supreme Court *Hope* and *Bluefield* decisions[1] and should therefore be rejected. DEC has not convincingly demonstrated that the 53 percent equity ratio optimizes its capital structure and results in the lowest cost of capital for customers. Generally speaking, the higher the equity ratio, the lower the level of financial risk faced by the firm and the lower the required rate of return on equity ("ROE"). The relatively high equity ratio proposed by DEC should correspond to a lower required rate of return than advocated by DEC's witness, Robert Hevert, which is based on his estimate of the proxy group utilities' cost of capital. Objective evidence demonstrates that DEC is less risky than the proxy group companies used by Mr. Hevert in his analysis. However, Mr. Hevert does not properly adjust for the differences in risk between DEC and the proxy group, leading him

[1] *See Federal Power Commission et al. v. Hope Natural Gas Co.,* 320 U.S. 591 (1944) and *Bluefield Water Works & Improvement Co. v. Public Service Comm'n,* 262 U.S. 679 (1923).

to overstate the required return on equity and leading him to an ROE recommendation that is inconsistent with the equity ratio applied for by the Company and excessive. I recommend that the Commission reject the ROE requested by the Company in favor of a lower ROE more in line with the lower risk profile of the company as demonstrated by objective measures and the higher equity ratio sought.

Q. HOW IS THE REMAINDER OF YOUR TESTIMONY ORGANIZED?

A. In Section III, I explain how DEC's support for the Power/Forward Carolinas investments, including the proposed regulatory treatment, is problematic. In Section IV, I offer evidence on the relative riskiness of DEC as compared to the proxy group used by Mr. Hevert and rebut his claim that DEC is riskier.

III. DEC'S PROPOSED USE OF A RIDER FOR SUCH A LARGE AMOUNT OF TRADITIONAL NETWORK INVESTMENTS SHOULD NOT BE APPROVED

Q. PLEASE DESCRIBE THE RIDER SOUGHT BY DEC TO RECOVER ITS "POWER/FORWARD" INVESTMENT.

A. In its Application, DEC seeks to recover through the use of a "Grid Reliability and Resiliency" (GRR) Rider "costs related to improving the reliability of the Company's grid infrastructure and to modernize aging facilities that are nearing end of life." DEC asserts that the GRR Rider will "operate in a consistent manner as other riders in North Carolina" and that it is necessary to provide funds for the "Power/Forward Carolinas" initiative, which DEC suggests "is necessary to accelerate the T&D investments being made to better serve customers, replace aging infrastructure, ensure the grid remains resilient and secure, respond to the growth in homes, businesses, and industry, and support the current and projected

wave of renewable projects."[2] DEC also requests "to defer such costs for future recovery if the proposed GRR Rider is not approved."[3]

Q. HOW MUCH MONEY IS DEC SEEKING TO RECOVER THROUGH THIS MECHANISM?

A. Duke anticipates that the Power/Forward Carolinas will require investments of $13.84 billion state-wide.[4] To compare, this dollar value of investment exceeds the current total utility rate base of DEC, which is $13.79 billion as proposed in the instant docket. It is also significantly larger than the applied-for $8.17 billion rate base of its affiliate, Duke Energy Progress, LLC ("DEP").[5]

If approved, DEC estimates that the associated increases in rates during the first ten years would be approximately $10 billion state-wide, with approximately $6 billion borne by DEC's customers and $4 billion borne by customers of DEP.[6] DEC is not proposing any specific cap on the amount of investment that could flow through the rider. Hence, if actual costs exceed forecasts, or if the program grows in size or scope, the effects on rates will be larger. In the context of the scale of electric utility investments, this is a very large initiative: greater in size than either utility's rate base, as noted. Focusing on DEC alone, the proposed tracker could more than double the Company's T&D rate base.

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[2] DEC Application, pages 5-6.

[3] McManeus Direct, page 4, lines 12-14.

[4] EY Report, North Carolina Impacts of Duke Energy's Power/Forward Grid Improvement Program, page 1.

[5] Regulatory Research Associates, Rate Case Profiles for Dockets D-E-7, Sub 1146 and D-E-2, Sub 1142.

[6] Source: DEC Response to Tech Customers Data Request 2-36.

Q. IS THE USE OF A RIDER MECHANISM A REASONABLE APPROACH TO RECOVERING THE POWER/FORWARD COSTS?

A. No, not under the circumstances presented here. The specific proposal of DEC, in this case, is not an appropriate use of a rider mechanism and is based on an investment program that has insufficient supporting analysis.

Q. IS THE DEFERRAL OF COSTS FOR FUTURE RECOVERY AN APPROPRIATE COST-RECOVERY ALTERNATIVE FOR POWER/FORWARD CAROLINAS IF THE PROPOSED GRR RIDER IS NOT APPROVED?

A. No. Deferring costs for future recovery is not appropriate either since the Power/Forward Carolinas investment program is not adequately supported. Not only is the GRR rider inappropriate, but so is the Company's proposal for a cost deferral.

Q. HOW HAVE ADJUSTMENT MECHANISMS BEEN TRADITIONALLY USED BY PUBLIC UTILITIES AND HOW HAS THAT EVOLVED OVER RECENT YEARS?

A. In regulatory practice in the United States, automatic rate adjustment mechanisms have traditionally been used to recover the costs of certain operating expenses such as fuel and purchased power where:

(1) The cost of the purchased resource is outside the control of the utility that purchases it;

(2) The item accounts for a significant or large component of the utility's total operating expenses; and

(3) Costs related to the resource are volatile and unpredictable.

As an example, fuel adjustment mechanisms are beneficial for both customers and the utility. They provide the utility a reasonable opportunity to recover their changing costs of procuring fuel and electricity. From the customer perspective, fuel adjustment mechanisms allow customers to see efficient price signals (reflecting the true cost of consumption) and to receive rapid decreases in their retail electricity costs when fuel markets decline.

In recent years, however, the breadth of adjustment clauses in some states has expanded beyond fuel and purchased power expenses and certain utilities have begun to employ tracker mechanisms for specific capital investment programs.

Q. HAS THE COMMISSION APPROVED TRACKER MECHANISMS FOR NEW INFRASTRUCTURE INVESTMENTS IN THE PAST?

A. Yes. The Commission has allowed specific utilities to implement infrastructure tracker mechanisms—with costs recovered via a rider—in limited circumstances; namely, where adoption of the rider was specifically permitted by statute and protections to the public interest were in place.

For example, the Commission allowed Piedmont Natural Gas to impose an Integrity Management Rider to recover ongoing capital expenditures associated with efforts to comply with federal pipeline safety and integrity requirements. In allowing this rider, the Commission noted that the rider was specifically authorized under G.S. 62-133.7A, which allows the Commission, when setting rates in a general rate proceeding, to adopt a rate adjustment mechanism to allow gas companies to recover "prudently incurred" capital costs associated with compliance

with federal gas pipeline safety requirements upon a finding that the mechanism is in the public interest.

Similarly, the Commission allowed Carolina Water Service to implement a water system improvement charge (WSIC) and sewer system improvement charge (SSIC) authorized by G.S. 62-133.12. Under this statute, the Commission is authorized to implement a rate adjustment mechanism for water/system improvement "found necessary by the Commission to enable the water or sewer utility to provide safe, reliable, and efficient service in accordance with applicable water quality and effluent standards."

Q. HOW IS DEC'S REQUEST FOR A CAPITAL TRACKER IN THIS PROCEEDING DISTINGUISHABLE FROM OTHER TRACKERS APPROVED BY THE COMMISSION OR BY OTHER STATE REGULATORS?

A. Several significant factors distinguish DEC's proposal from the capital trackers approved by this Commission and other state regulators in the past. First, as mentioned, those other trackers previously approved by the Commission were specifically authorized by statute. As a legal matter, I have been informed by counsel that there is no express statutory authority for the tracker sought by DEC, and hence a legal uncertainty as to whether the Commission can authorize the rider without an enabling statute. In addition, as a matter of regulatory economics, an important distinguishing factor is the sheer size of the investment program (larger than either utility's rate base) and the fact that it will tilt the regulatory framework in favor of DEC and its shareholders by allowing it to replace a large share of its

net plant in rate base over ten years without a general rate case proceeding. In contrast, as shown in Table 1 below, other capital trackers tend to be associated with smaller investment programs and have shorter terms.

Table 1: DEC's Proposed Tracker Compared to Others Outside of N.C.

Company	State	Program	Authorized Spend	Term
Duke Energy Corporation	NC	Power/Forward Carolinas	$13+ billion[7]	10 years
Baltimore Gas and Electric Co.	MD	Strategic Infrastructure Development and Enhancement	$400 million	5 years
Atlanta Gas Light Co.	GA	Integrated Vintage Plastic Replacement	$275 million	5 years
Atlanta Gas Light Co.	GA	Integrated System Reinforcement	$214.8 million	5 years
South Jersey Gas Co.	NJ	Storm Hardening and Reliability	$103.5	3 years
Atlantic City Electric Co.	NJ	Grid Resiliency	$79 million	5 years
Atlanta Gas Light Co.	GA	Integrated Customer Growth	$46 million	5 years
Rockland Electric Company	NJ	Storm Hardening	$15.7 million	3 years
Public Service Electric and Gas Co.	NJ	Energy Strong	$1 billion	3 years
Public Service Electric and Gas Co.	NJ	Gas System Modernization	$650 million	3 years

[7] The $13+ billion budget reflects Duke's state-wide forecast spend, which has not yet been approved by the Commission. The amounts for other utilities reflect approved spending levels. It is my understanding that DEP has not yet requested a tracker mechanism.

Finally, the NCUC-authorized capital trackers I reviewed were part of efforts to comply with statutory or regulatory compliance mandates or to advance economic development efforts. By contrast, DEC is seeking to recover in its proposed rider new network investments that cannot easily be distinguished from its traditional network investments and are not a direct response to new regulations or government-directed initiatives.

Q. CAN SUCH TRACKER MECHANISMS POSE RISKS TO THE PUBLIC INTEREST?

A. Yes. When this Commission approved capital tracker mechanisms in the past pursuant to statute, it recognized that they offer advantages and disadvantages. The Commission has noted that one advantage of a rider mechanism is to avoid repeated rate cases, but it has also highlighted that tracker mechanisms can pose risks to the public interest.[8] In the instant matter, DEC's proposed rider for Power/Forward Carolinas poses the threat to the public interest of a capital program of this scale not being properly vetted. I note that in other jurisdictions, stakeholders have expressed concern regarding the ability to review for prudence capital investments that flow through automatically into rates. A distinguishing feature of the tracker proposed by DEC is that it is one-sided: it only passes on additional costs to the consumer, not decreases in the cost of service inputs.[9]

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[8] *In the Matter of Application of Piedmont Natural Gas Company, Inc. for a General Increase in its Rates and Charges*, Order Approving Partial Rate Increase and Allowing Integrity Management Rider, Docket No. G-9, Sub 631, at page 39 (Dec. 17, 2013).

[9] Technically, as the assets for Power/Forward Carolinas are depreciated for regulatory accounting purposes, the net plant to which a return is applied will decrease, along with

I do not intend to mean that the use of tracker mechanisms is not appropriate in some circumstances, but it should be recognized that these circumstances are limited and safeguards must be put in place to assure that the tracker does not unbalance the overall regulatory process.

Q. ARE YOU SUGGESTING THE COMMISSION SHOULD APPROVE THE PROPOSED TRACKER WITH LIMITS ON THE SCALE AND SCOPE AND SAFEGUARDS TO PROTECT THE PUBLIC INTEREST?

A. No. The evidence on record more than adequately demonstrates that the proposed tracker is not in the public interest given the size of the investment program, the lack of distinguishability from other T&D investments, errors and omissions in the analysis offered in support of the investment program, and for other reasons mentioned throughout my testimony.

Q. PLEASE SUMMARIZE THE KEY ECONOMIC ISSUES THAT YOU IDENTIFY WITH RESPECT TO DEC'S POWER/FORWARD CAROLINAS TRACKER PROPOSAL.

A. DEC's proposal has at least three elements that are problematic from the perspective of regulatory economics:

(1) The classes of investments that would be eligible for treatment under the tracker are not sufficiently distinguished from customary spend on the transmission and distribution networks.

(2) The size and scope of the Power/Forward Carolinas investment program are so big that pursuit of the rider

depreciation of the assets in rate base. However, the net effect on rates will still be higher than if the investment in the asset had not been made.

treatment threatens to supplant the role of the general rate case, thereby unbalancing the regulatory framework.

(3) The analysis advanced by DEC in support of the investments in Power/Forward Carolinas is flawed.

A. DEC has not Distinguished the Power/Forward Carolinas Program from its Other Network Investments

Q. AS TO YOUR FIRST POINT, HOW DOES DEC CHARACTERIZE THE POWER/FORWARD CAROLINAS INVESTMENTS?

A. DEC explains that the Power/Forward Carolinas program anticipates the following types of investments:

Table 2: Summary of Power/Forward Carolinas Investments

Targeted Underground (TUG)	Converting heavily-treed neighborhoods prone to power outages from overhead to underground construction to decrease outages, reduce momentary interruptions (blinks), improve major storm restoration time, and improve customer satisfaction.
Distribution Hardening & Resiliency	Upgrading equipment to lower system outage risk due to asset failure (hardening) and to minimize the impacts of events and improve ability to recover rapidly when events occur (resiliency). This program also addresses asset end-of-life opportunities, system design, and physical and cyber security.
Transmission Improvements	Deploying equipment upgrades, flood mitigation, physical and cyber security, and system intelligence to make a smarter, more reliable and secure transmission system.
Self-Optimizing Grid (SOG)	Applying modernization investments to build a more resilient distribution system better able to isolate problems and re-route power to minimize impacts to our customers and communities. To enable SOG functionality, circuits will have automated switches approximately every 400 customers, or 2 MW peak load, or 3 miles in circuit segment length.
Advanced Metering Infrastructure (AMI)	Deploying digital smart meters and associated communication devices to provide enhanced customer billing and payment options, detailed usage data, and energy-savings tools, as well as enhanced operational functions such as automated meter-reading, remote service connections and outage detection.

Communication Network Upgrades	Providing high-speed, high bandwidth, secure communications pathways (fiber optic and wireless) for the increasing number of smart components, sensors, and remotely activated devices on the transmission and distribution systems.
Advanced Enterprise Systems	Upgrading systems that manage grid devices, monitor equipment health, analyze data from monitoring sensors to improve system operations and maintenance activities, and enable grid self-optimizing technologies.

Source: Executive Technical Overview (DEC Response to Tech Customers Data Request 2-14).

Q. DOES DEC CLAIM THAT THESE ARE DISTINCT FROM TRADITIONAL NETWORK INVESTMENTS?

A. Yes. DEC alleges that these are not investments that could reasonably be categorized as customary spend. For example, when asked if there are grey areas where assets could reasonably be included either in customary spend or in Power/Forward Carolinas, DEC responded that there were no grey areas. However, DEC clarified that one area of investment, the Hardening/Resiliency asset classes, could reasonably fall into either the customary spend or Power/Forward Carolinas rider.[10]

Q. DOES DEC SUCCEED IN DIFFERENTIATING THE POWER/FORWARD CAROLINAS INVESTMENTS?

A. No. In its pre-filed testimony and discovery responses, DEC fails to provide a compelling distinction between the types of network investments that would be eligible for recovery via the Power/Forward Carolinas rider and those that would be subject to traditional ratemaking. The near-term budget of $2.9 billion for

[10] Source: DEC Response to Tech Customers Data Request 2-10.

Power/Forward Carolinas includes investments that are seemingly a routine part of DEC's normal course of business.

Table 3 below illustrates how the same classes of investments could be eligible for treatment under the rider or under traditional ratemaking. It does so using quotations from DEC's pre-filed testimony and interrogatory responses, related to costs categorized as customary spend and costs in the Power/Forward Carolinas rider. These quotations indicate that DEC has included costs of similar types and purposes in the Customary Spend and Rider categories.

Table 3: Customary Network Investments *vs.* Power/Forward Carolinas

Class of Investment	**Characterized by DEC as Traditional T&D investment (Customary Spend)**	**Characterized by DEC as Eligible for Power/Forward Carolinas Rider**
Security	"cyber security and physical security programs" (Simpson Direct, p.10, line 17)	"physical and cyber security" (Simpson, Exhibit 2, p.1)
Capacity	"the $3.4B includes capacity increases to distribution circuits and T/D substations for load growth." (IR 2-8)	"adding capacity to distribution circuits and substation transformers" (Simpson, p.29, line 21)
Transformer Retrofit	"transformer retrofit program to reduce the number of outages per 100 line miles and reduce the impact on customers due to equipment failure and animal intrusion" (Simpson Direct, p.22, line 5)	"retrofitting transformers to eliminate common outage causes" (Simpson, p. 27, line 13)
Sectionalization	"sectionalization programs designed to reduce the impact of outages on customers" (Simpson Direct, p.22, line 8)	"sectionalization" (Simpson, Exhibit 2, p.1)
Urban Renovation	"urban renewal projects" (Simpson Direct, p.13, line 1)	"urban UG uplift" (Simpson, Exhibit 2, p.1)
Replacement of Grid Components	"the replacement of deteriorated wood poles and replacement of obsolete substation and line equipment" (Simpson Direct, p.10, line 21) "replacement of capital units of property during routine outage events, the relocation of lines to accommodate highway projects,…and conductor	"replacing aging components like transformers, cables and conductors" (Simpson, p.6, line 14)

	replacements." (Simpson Direct, p.12, line 22) "distribution line rebuilds and relocations, as well as programs to replace equipment like house power panels that have reached the end of life" (Simpson Direct, p.12, line 19)	
Undergrounding	"pole replacement and underground cable replacement" (Simpson Direct, p.12, line 5) "underground primary cable replacement where outage history and cable analysis predict failures" (Simpson Direct, p.12, line 17)	"targeted undergrounding" (Simpson, p.25, line 10)
Automated Outage Isolation	"self-healing teams that apply state-of-the-art technology to automatically isolate the cause of an outage and restore service to customers." (Simpson Direct, p.12, line 11)	"the grid can self-identify problems and react to them by isolating affected areas and automatically rerouting power, shortening or even eliminating outages for many customers." (Simpson, p.30, line 6)
Outage Mitigation	"prevent line and transformer overloads that could occur during certain failure contingencies on the transmission system." (Simpson Direct, p.10, line 5) "adding many breakers to reduce the likelihood of customer outages and improve operating flexibility." (Simpson Direct, p.10, line 8) "identify and resolve physical limitations that might prevent lines from being operated at required capacity" (Simpson Direct, p.10, line 16)	"reducing the number of customers affected by an outage; and reducing duration" (Simpson, p.6, line 16) "customers experience less interruptions" (Simpson, Exhibit 2, p.1)

Q. DO YOU HAVE ADDITIONAL EVIDENCE OF AMBIGUITY IN THE SEPARATION OF T&D INVESTMENTS TO BE TREATED IN DEC'S NEXT GENERAL RATE CASE FROM THOSE WHOSE COSTS WILL BE RECOVERED THROUGH THE RIDER?

A. Yes. DEC clarifies in response to Tech Customers Data Request 2-7 that its forecast $4.5 billion in customary T&D spend cited by Mr. Simpson in direct testimony has

been reduced to $3.4 billion because $1 billion had been moved from the customary category to the Power/Forward Carolinas cost bucket. The apparent fungibility of this $1 billion in investment underscores the lack of distinction between traditional or customary spend that would be treated in DEC's next general rate case and the investments proposed for cost recovery via the rider.

Q. HOW DOES DEC'S FORECASTED T&D SPEND COMPARE TO HISTORIC LEVELS?

A. DEC's investment in new T&D facilities has been approximately $2.6 billion over the past four years.[11] Over the next five years, DEC anticipates approximately doubling that figure, when both the customary spend and Power/Forward Carolinas initiative are considered.

Q. WHAT CONCLUSION DO YOU DRAW FROM YOUR ANALYSIS OF THE POWER/FORWARD CAROLINAS INVESTMENTS?

A. The main conclusion is that the types of investments considered for the tracker are difficult to distinguish from customary network upgrades. Since trackers are often put in place for investments of limited scope, the inability to distinguish the proposed tracker investments from customary network upgrades provides further support for rejecting DEC's proposal. If approved, DEC will have an incentive to run new T&D investments through the more favorable tracker mechanism and not through the general rate case process.

[11] Simpson Direct, page 9, lines 1-3.

B. DEC's Power/Forward Carolinas Proposal Threatens to Unbalance the Regulatory Framework

Q. REGARDING YOUR SECOND CONCERN WITH DEC'S TRACKER PROPOSAL, WHAT DO YOU MEAN WHEN YOU SAY IT WILL UNBALANCE THE REGULATORY PROCESS?

A. Through its tracker, DEC is proposing to isolate certain routine network investments and have those investments reflected in higher rates without a general rate case. The treatment of new network investments in general rate cases assures that changes in *all aspects* of the utility's cost of service are addressed and considered in the revenue requirement approved by the regulatory agency for the establishment of rates. This means that rates are reset taking into account the full picture of (1) the rate base, netting the effects of new capital additions and reduced plant balances for existing assets (resulting from greater accumulated depreciation); and (2) operating expenses, netting the effects of increased operating expenses (and depreciation) against any decreases in operating expenses (and depreciation) on other assets. For example, one potential source of savings from the Power/Forward Carolinas initiative would be a reduction in losses on the power grid. DEC's proposed rider does not account for potential savings associated with reduced kilowatt hour losses.

DEC's proposed use of a rider for such a significant quantity of network investments would unbalance this regulatory process and would make it one-sided, *i.e.*, taking into account increases in net plant and operating expenditures without reflecting corresponding decreases in other areas of the utility's business. This

unbalancing, given the sheer magnitude of the investments at stake, could lead to situations where the rates are significantly out-of-sync with the utility's cost of service. As noted above, the Commission had been concerned about this risk for another utility in North Carolina and took comfort in the limited scope and size of the rider it approved. It is of particular concern for Power/Forward Carolinas, given the proposed state-wide investment program of over $13 billion.

Q. DEC ARGUES ONE OF THE JUSTIFICATIONS OF ITS PROPOSED RIDER IS A REDUCTION IN REGULATORY LAG. DO YOU AGREE?

A. No. DEC argues that a key benefit of the tracker is to reduce regulatory lag and that the Commission has recognized this benefit when approving statutorily-authorized trackers for other utilities. I do not find this benefit compelling under these circumstances.

First, regulatory lag is a traditional part of the ratemaking process. Second, the capital tracker is not the only tool available to reduce regulatory lag. Other mechanisms exist in the regulatory toolkit to do so without unbalancing the regulatory process. The North Carolina ratemaking process relies upon a historic test period, adjusted for known and measurable changes. This adjustment for known and measurable changes is one of the tools that the Commission uses to reduce regulatory lag. Hence, the existing regulatory framework already contains mechanisms to address the concerns voiced by DEC without the need for a rider.

At the federal level, the FERC has adopted measures to confront regulatory lag. For example, it uses formula rates to eliminate regulatory lag for key elements of the cost of service. However, it does not only focus on factors that increase rates;

it also takes into account factors that decrease rates (such as depreciation on existing assets).

Q. CAN DEC MANAGE REGULATORY LAG THROUGH MEANS OUTSIDE THE REGULATORY PROCESS?

A. To some extent, yes. In its presentation at the November 2017 Edison Electric Institute Fall Investor Meeting, DEC's parent company noted that it is actively addressing regulatory lag through several means including customer growth, focused cost management efforts, and wholesale expansion. These market-related opportunities to manage regulatory lag are independent of the regulatory process. Coupled with accommodations within the existing regulatory framework, these factors provide further evidence that DEC can address the problems it identifies without the need to implement a capital tracker.

Q. DID DEC SUPPORT THE FINANCIAL BENEFITS OF THE TRACKER WITH FORECASTS?

A. No. DEC witness McManeus states: "The inability to collect amounts from customers in the same timeframe that the Company makes large grid investments will dilute cash flows and earnings."[12] However, when asked in discovery for data showing the projected levels of dilution in cash flows and earnings without the rider, DEC stated that no such forecast had been made.[13]

[12] McManeus Direct, page 34, lines 13-15.

[13] *See* DEC Responses to Tech Customers Data Request 2-6 and 2-30 (attached as Exhibit KGS-2).

Q. CAN YOU PROVIDE THE COMMISSION WITH AN OVERVIEW OF GENERAL TRENDS IN THE APPLICATION OF CAPITAL TRACKERS ACROSS THE COUNTRY?

A. Yes. My review of capital trackers in other jurisdictions reveals the following elements that have been employed:

- **Clear definition of eligible assets.** It is common in capital trackers for the eligible assets to be well defined.
- **Ceiling (or other limitation) on the investments.** In several trackers I reviewed, the regulatory commission limited the eligible assets to a certain dollar amount or imposed some other limitation on the investments included in the tracker.
- **O&M Offset.** In one asset modernization capital tracker program I reviewed, the Commission implemented a reduction in operations and maintenance expense to reflect the fact that the new, modernized asset required less maintenance than the old asset.

Exhibit KGS-3 contains a summary of these elements as they are employed in other capital trackers. DEC's Power/Forward Carolinas program differs markedly from the trackers I reviewed in its sheer size and scope and its departure from the common practice of defining eligible investments clearly.

C. <u>DEC's Analysis of Power/Forward Carolinas is Flawed and Incomplete</u>

Q. WITH REGARDS TO YOUR THIRD KEY CONCERN, GIVEN THE SCALE OF INVESTMENTS CONTEMPLATED UNDER THE POWER/FORWARD CAROLINAS PROGRAM, IS IT APPROPRIATE TO SCRUTINIZE THE COSTS, BENEFITS, AND RISKS OF THE INVESTMENTS?

A. Yes. In regulatory practice, the larger the investment, the more scrutiny it receives. The utility must take greater care while reaching a decision when that decision involves a greater dollar investment and a greater level of uncertainty. At $13.84 billion, the state-wide Power/Forward Carolinas program is of sufficient scale to merit intense scrutiny. The scale of state-wide T&D investment foreseen for Power/Forward Carolinas is larger than the rate base of either DEC or DEP, and it more than doubles DEC's T&D rate base. As an additional point of comparison, DEC's share of the investment is over three times as large as its recent investment in the Cliffside steam generation station. From 2008 to 2012, DEC spent $2.1 billion developing the 825 MW Unit 6 at Cliffside.[14]

Q. WHAT EVIDENCE HAS DEC PROVIDED TO SUPPORT THE REASONABLENESS OF THE POWER/FORWARD CAROLINAS PROGRAM?

A. The evidence provided by DEC that purports to justify the expenditures in Power/Forward Carolinas consists of:

(1) a report by the consulting arm of Ernst & Young (EY), an accounting firm; and

(2) an "Executive Technical Overview" prepared by the Company.

[14] *See* https://news.duke-energy.com/releases/cliffside-steam-station-renamed-the-james-e-rogers-energy-complex and SNL page on James E Rodgers (Cliffside) plant.

Q. PLEASE DESCRIBE THE EY REPORT.

A. The Ernst & Young study—titled "North Carolina impacts of Duke Energy's Power/Forward grid improvement program"—presents the results of that firm's economic impact study of the proposed program. The economic impact study claims that Duke's investments in reliability improvements will reduce overall business and household costs associated with outages at the expense of increased electric rates. The expected investment costs (as they appear in rates) are similar to the estimated reduction in business and household costs associated with outages (see Figure 1 below). Additionally, the EY report asserts that Duke's planned $13.84 billion investments for Power/Forward Carolinas will also provide a one-time boost in the form of additional jobs in North Carolina over a 10-year period. EY points to a variety of projected measures, such as jobs, economic output, GDP, labor income, and taxes. The EY report on Power/Forward Carolinas focuses on indirect effects of the program (such as jobs and economic multipliers). As I describe in detail below, however, EY has not correctly assessed these indirect effects, and the focus on indirect effects is a departure from traditional utility planning procedures that evaluate direct effects of new investments. While in certain instances, utilities can and do assess indirect effects, it would be unusual, in my experience, for a decision to hinge entirely on them.

Q. PLEASE DESCRIBE THE "EXECUTIVE TECHNICAL OVERVIEW" PREPARED BY THE COMPANY.

A. The Power/Forward Carolinas Executive Technical Overview provides a high-level overview of the ten-year grid modernization plan. The report focuses on the need

to reduce service interruptions, as measured by SAIFI, SAIDI, and MED. It addresses seven main areas of investment: (1) targeted underground, (2) distribution hardening and resiliency, (3) transmission improvements, (4) self-optimizing grid, (5) advanced metering infrastructure, (6) communication network upgrades, and (7) advanced enterprise systems. As noted, the sum of the planned investments in the seven categories equals over $13 billion state-wide.

Q. WHAT ARE THE MAIN PROBLEMS YOU IDENTIFY IN THE ANALYSIS PRESENTED BY DEC?

A. I identify three main problems in the EY analysis presented by DEC:

- The benefit-cost analysis is misguided in using indirect benefits as the primary focus. The proper primary focus should be direct benefits and costs; and
- The analysis excludes any assessment of risks. An investment of this scale should be evaluated not only on an expected value basis, but also considering key risk factors.
- The analysis is premised on the existence of "deteriorating reliability trends." Careful inspection of the data presented on reliability trends does not clearly establish a trend of deterioration.

Q. WHAT ARE THE DIRECT BENEFITS OF DEC'S PROPOSED POWER/FORWARD CAROLINAS PROGRAM?

A. The direct benefits are the economic benefits from a reduction in expected outage frequency and duration. For example, a business may face lower costs from a reduced duration of business interruption after an outage if DEC is successful in reducing the duration of outages. DEC uses the "ICE" model to estimate the monetary value for customers of this improvement in reliability.

Q. IN CONTRAST, WHAT ARE THE INDIRECT BENEFITS DISCUSSED IN THE EY REPORT?

A. The EY Report is a study of "economic impacts" (*i.e.*, indirect effects) of the investment program. These include the effect on jobs and economic output (*e.g.*, state-wide GDP). As an example, EY expects DEC's new employees and/or contractors (retained to implement Power/Forward Carolinas) will spend money in the North Carolina economy, thereby boosting GDP. EY presumes that GDP would increase in a multiple of the increase in consumer spending, as explained by Burda and Wyplosz in their macroeconomic text:

> Each individual's spending is someone else's income. An exogenous increase in demand induces further increases in spending by other households. As long as output responds passively to demand, this will lead to additional income; and so on. GDP growth will not continue ad infinitum, however. The multiplier is finite, because at each stage of spending some positive fraction of income leaks from the circular flow of income. (p.273) [15]

In principle, indirect effects *should* also account for the negative consequences of raising electricity rates to fund the Power/Forward Carolinas investment program and the rippling economic effects from taking that money away from households and businesses. This is a negative multiplier effect that needs to be taken as an offset to any positive multiplier effect.

[15] Michael Burda and Charles Wyplosz, Macroeconomics: A European Text, Second Edition, Oxford University Press, 1997.

Q. HOW MUCH OF THE EXPECTED NET BENEFIT OF POWER/FORWARD CAROLINAS DOES DEC ATTRIBUTE TO INDIRECT FACTORS?

A. The vast majority of reported net benefits are indirect; the net direct benefit reported by EY equates to a small fraction of the total purported benefits. In fact, the direct net benefit estimated to accrue to customers from the direct benefit-cost analysis is approximately one percent of the purported total benefits of Power/Forward Carolinas. As shown in Table 4 below, ninety-nine percent of the stated benefits in Figure 5 of the EY report are attributable to indirect benefits.

Table 4: Comparison of Direct Net Benefits to Indirect Net Benefits

Category of Benefit	Net Benefit ($)[16]	Net Benefit (%)
Benefit-Cost- Analysis: Direct Costs of Increased Electricity Rates *vs* Direct Benefits of Facility and Grid Investment	0.27 Billion	1 percent
Indirect Benefits: State-wide Total Change in Gross Economic Output	22.72 Billion	99 percent

Q. IS DEC'S EVALUATION OF INDIRECT BENEFITS REASONABLE?

A. No. Its focus is on the creation of new jobs and the multiplier effects in the North Carolina economy. Yet, the manner in which EY structured the indirect benefit assessment is flawed. EY focuses on one side of the benefits—those associated with new jobs. EY does not properly take into consideration the offsetting negative

[16] Derived from Figure 5 of EY Report "North Carolina impacts of Duke Energy's Power/Forward grid improvement plan," Nov. 2017. Dollar figures shown in 2017 dollars. Assumed real discount rate of 5.81% (7.93% weighted average cost of capital; 2% assumed inflation rate); however, differences in the discount rate do not materially affect the result.

effects of higher electricity rates. Increased electricity rates remove money from the pockets of the businesses and residents of North Carolina, and therefore in turn reduces their ability to contribute to the overall output of the North Carolina economy. The EY report completely ignores this latter negative effect for residential customers and consequently overstates the net benefits of the Power/Forward Carolinas program.[17]

Q. WHAT ABOUT DIRECT NET BENEFITS: HOW MUCH VALUE HAS DEC ATTRIBUTED TO THESE?

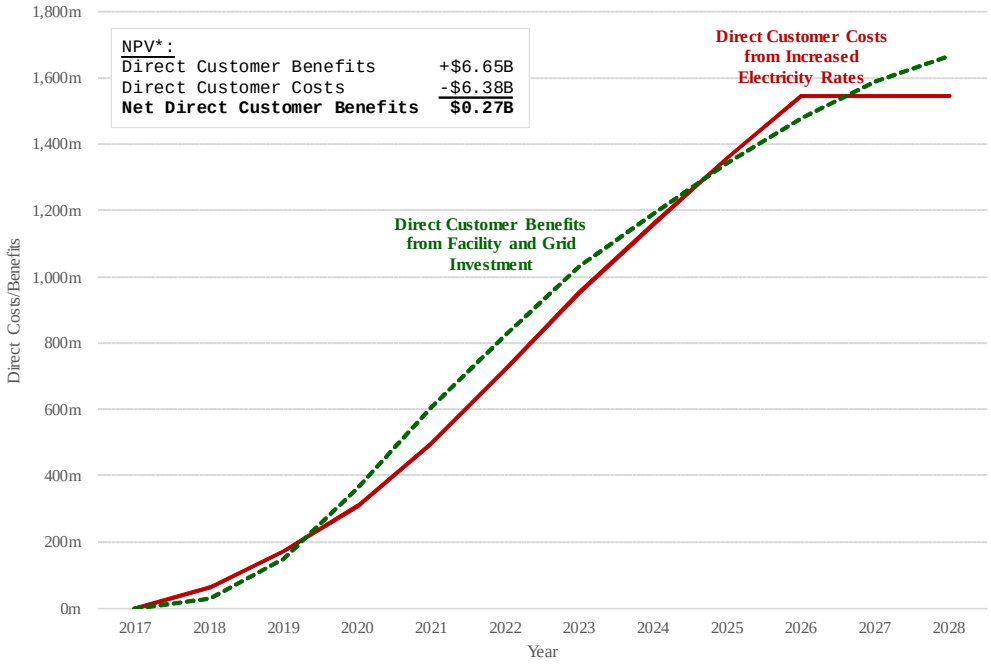
A. As shown in Table 4, the direct net benefits that DEC has attributed to the Power/Forward grid improvement plan is small relative to the size of the investments. In its response to Tech Customers Data Request 2-38, DEC indicated that the direct net benefits are shown in two of the four line series in Figure 5 of the EY report and supplied the underlying data. The information relevant to the direct cost-benefit analysis is reproduced in Figure 1 below.[18]

[Figure 1 on following page]

[17] Source: DEC Response to Tech Customers Data Request 2-37.

[18] Source: DEC Response to Tech Customers Data Request 2-38.

Figure 1: Direct Costs and Benefits of Power/Forward Carolinas



*Assumes 5.81% real discount rate (figures presented are in 2017 dollars). 5.81% real discount reflects the requested 7.93% WACC and assumed 2% inflation rate.
Source: IR 2-38 refers to Figure 5 of Ernst & Young Report "North Carolina impacts of Duke Energy's Power/Forward grid improvement program"

As shown in Figure 1, the direct customer benefits from facility and grid investment (reduced outage time) track closely with the direct customer costs from increased electricity rates. Thus, it is unsurprising that the NPV of the net effect is small, $0.27 billion, relative to the investment of over $13 billion over ten years.

A $13.84 billion investment plan that nets little in net direct customer benefits should be cause for concern, since it leaves little margin of safety. Should the costs of the investment prove to be larger than the estimates, or the benefits to customers of reduced outage time prove to be less than forecast, then the investment would not support itself on a direct cost-benefit basis.

Q. HAS DEC PRESENTED THE DIRECT NET BENEFITS WITH CONFIDENCE?

A. No. A close reading of the EY report shows that the direct benefits are speculative and unsubstantiated. EY repeatedly refers to direct benefits that "could" accrue to North Carolina ratepayers. However, EY does not place a probability on the realization of those benefits, nor is it certain that they can measure such benefits with reasonable levels of confidence. EY's characterization is not surprising given the difficulties of measuring the direct costs of outages. The cost of unserved energy is notoriously difficult to quantify. It varies by individual customer and by duration and timing of the outage. Given the wide range of plausible values for the cost of unserved energy, it is reasonable to expect the confidence level for any estimates of direct benefits to be low.

Q. WHAT RISKS HAS DEC FAILED TO ANALYZE IN THE DOCUMENTS ADVANCED IN SUPPORT OF THE POWER/FORWARD CAROLINAS PROGRAM?

A. DEC has not presented any analysis whatsoever of risks. A $13+ billion investment program inherently carries risk. A few examples of pertinent risks include:

- That actual costs turn out to be higher than the $13+ billion projection. With the ten-year horizon for the initiative, changing circumstances could lead to a higher than forecast cost of materials and labor. Similarly, conditions in the capital markets may tighten and the cost of carrying the new assets in rate base may increase.

- That the reductions in duration and frequency of outages do not materialize as projected;

- That the investment program triggers stranded costs. DEC will be investing heavily in grid infrastructure based on current technology. Obsolescence is a substantial risk for any technology. DEC does not address the trade-off between committing to major investment dollars now versus smaller

investments with the option value of a wait-and-see approach. Nor is there any meaningful analysis of using maintenance programs (such as vegetation management) as an alternative to major capital expenditures.

- That higher rates have other consequences such as:
  - Industrial customers moving jurisdictions, which would lead to a reloading of costs onto the remaining customers.
  - Residential and small commercial customers increasing the levels of behind-the-meter generation, again putting pressure on the full recovery of DEC's cost of service.

Q. WHAT ARE THE IMPACTS ON REVENUE REQUIREMENTS FROM DEC'S POWER/FORWARD CAROLINAS INITIATIVE AND ITS CUSTOMARY T&D SPEND PROGRAM?

A. DEC has provided an assessment of the incremental revenue requirements that will be charged to its customers as a result of Power/Forward Carolinas. The cumulative amounts over ten years are shown in Table 5 below:

Table 5: Incremental DEC Revenue Requirements for Power/Forward Carolinas

Residential	Commercial	Industrial	Lighting	Total
$4.134 billion	$0.789 billion	$0.779 billion	$0.036 billion	$5.740 billion

Source: DEC Response to Tech Companies Data Request 2-36.

Although I have not seen any forecasts from DEC of the revenue requirement effects of the planned $3.4 billion in customary T&D spend, if the revenue requirement increases were proportional to the size of investment, using Power/Forward Carolinas as a benchmark would suggest an increase in revenue requirements of roughly $2.9 billion.

Q. HAS DEC PROVIDED THE PERCENTAGE RATE INCREASES ASSOCIATED WITH THE INVESTMENTS?

A. Yes. DEC indicated the percentage rate increases for Power/Forward Carolinas relative to the baseline revenue requirement requested in this proceeding. These are shown in Table 6 below.

Table 6: DEC Cumulative Ten-Year Rate Increases for Power/Forward Carolinas

Residential	Commercial	Industrial	Lighting	Total
29.0%	14.3%	7.5%	4.5%	18%

Source: DEC Response to Tech Companies Data Request 2-36.

I have not seen similar estimates for the planned $3.4 billion in customary T&D spend.

Q. DO YOU FIND COMPELLING DEC'S ARGUMENT THAT WORSENING RELIABILITY TRENDS UNDERSCORE THE NEED FOR POWER/FORWARD CAROLINAS?

A. No. The data DEC has provided do not unambiguously establish a strong worsening trend. In order to reach its conclusion on worsening reliability, the Company has used a spreadsheet-based trend function whereby the strength of the result is dependent on the length of historical period considered.[19] As a matter of statistical measurement, I do not believe it is fair or appropriate to interpret a strong trend from the data DEC used. As such, I do not believe the data is compelling in

[19] Source: DEC Response to Tech Customers Data Requests 2-16, 2-17, and 2-31.

its support of the Company's decision to more than double the rate base for T&D through the Power/Forward Carolina initiative.

Q. DID DEC LINK THE RATIONALE FOR POWER/FORWARD CAROLINAS TO THE HISTORIC EXPERIENCE WITH OUTAGES?

A. No, not in a compelling manner. In the evidence presented, DEC includes historical outage metrics such as SAIFI and SAIDI. DEC also includes a forecast of these two key performance metrics after the Power/Forward Carolinas initiative is complete. However, apart from making a broad assertion that the proposed investment will remedy problems observed historically in the outage performance of the systems, DEC does not directly link the proposed investment program to deficiencies in the existing network. The outside observer cannot see that a thorough evaluation of all alternatives (including increased maintenance as a substitute for capital investment) has been undertaken. It is clear from historic data that vegetation-related outages have been a large share of recent outages. However, whether expensive network solutions are more cost-effective for ratepayers than a larger tree-trimming program remains an open question. While DEC provides data on historic outages, it does not convincingly justify the merits of its proposed response.

Q. PLEASE COMMENT ON THE CERTAINTY OF DEC'S FORECAST SAIFI AND SAIDI METRICS AFTER COMPLETION OF THE POWER FORWARD CAROLINAS INVESTMENTS.

A. DEC recognizes that there is substantial uncertainty surrounding the forecast reductions in SAIDI and SAIFI. In the Executive Technical Overview, DEC notes:

> To acknowledge the increasing uncertainty of these projections further out in time, we have overlaid cones of uncertainty for each reliability measure forecast. These cones of uncertainty are merely illustrative. Additional work is underway to apply even more rigorous methods to determine actual levels of forecast uncertainty. (p. 4)

As of the drafting of my testimony, DEC has not supplemented the evidence on record to include the uncertainty measures using rigorous analytical techniques.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS WITH RESPECT TO THE COSTS, BENEFITS AND RISKS OF POWER/FORWARD CAROLINAS.

A. In sum, DEC fails to establish that these revenue requirement increases are worthwhile and necessary to maintain safe, reliable service at reasonable cost-based rates. Instead, DEC has focused principally on the *indirect* benefits of the Power/Forward program, painting it as a jobs plan that will have rippling effects through the economy. DEC's evidence is missing key data. DEC has not assured interested parties that there is, in fact, a problem. Nor has it established that the proposed investment program is superior to alternatives that could provide the same reliability enhancements, taking into account both costs and risks.

Q. IN LIGHT OF DEC'S INTENT TO MODERNIZE ITS BUSINESS MODEL AND SERVICE OFFERING, ARE THERE ANY INITIATIVES THAT ARE MISSING FROM ITS PROPOSAL?

A. Yes. DEC has sought to go it alone in its efforts to modernize its business model and service offering for customers. In contrast, other utilities, including Dominion North Carolina Power ("Dominion"), have joined Regional Transmission Organizations ("RTOs"). In the context of a strategic modernization program, the opportunity to join an RTO merits consideration and analysis.

Q. COULD DEC ENHANCE ITS OVERALL SERVICE OFFERING BY JOINING AN RTO?

A. While the precise benefits, costs and risks of joining an RTO would need to be studied, *prima facie* indicators suggest that that DEC could enhance its service offering by joining an RTO like the PJM Interconnection ("PJM") or Midcontinent Independent System Operator (MISO). The Commission recently reviewed Dominion's experience as a participant in PJM and held that "there has been a net economic benefit to DNCP's customers from PJM membership."[20] The evidence put forth by the Public Staff in that docket demonstrated that "the Public Staff expects the net benefits of DNCP's membership in PJM to continue, driven mainly by fuel cost savings."[21] Fuel savings occur because, through PJM, its members have access to a broader set of generation resources and a more frequent (five-minute) optimization of generation resources to meet load across the entire PJM footprint. Access to this broader set of resources would create opportunities to substitute less-expensive generation for DEC's own higher-cost generation and to use DEC's generation to make incremental power sales to other load-serving entities when economic. Many of these substitutions and incremental power sales would not happen *but for* integration into an RTO market.

[20] *See* Order Approving Rate Increase and Cost Deferrals and Revising PJM Regulatory Conditions, Docket No. E-22, Sub 532 (Dec. 22, 2016), at 144.

[21] *Id.*

Q. IS THERE A POTENTIAL FOR OVERLAP BETWEEN DEC'S POWER FORWARD CAROLINA INVESTMENTS AND EFFORTS IT MIGHT TAKE TO JOIN AN RTO?

A. Yes. One focus area for Power/Forward Carolinas is DEC's transmission system. If DEC were to pursue membership in an RTO, its transmission planning process would be rolled into a broader regional transmission planning run by that organization. At the time Dominion sought approval from this Commission to participate in PJM, an expert for PJM testified that Dominion would benefit from:

> improved transmission planning and reliability due to the regional transmission planning process of PJM, working very closely with Dominion and other participants. This process enables us to provide what we characterize as 'and solutions' — solutions that are larger than those that can be generated by Dominion acting solely as a planning entity within their own system. . . . By comparison today. Dominion is only able to construct facilities within its own footprint and may have to build costly additional infrastructure to solve problems where an alternative, looking at the broader picture, might provide the equivalent reliability at a lower cost.[22]

Since Power/Forward Carolinas includes a focus on enhancing transmission reliability, it is timely for DEC to analyze whether integration into a broader regional market could provide that enhanced reliability at a lower cost.

Q. PLEASE SUMMARIZE THE POTENTIAL BENEFITS FROM JOINING AN RTO.

[22] Docket No. Docket E-22, Sub 418, Transcript, Vol. 7, p. 89, lines 3-11, and p. 91 lines 11-16.

A. Joining an RTO offers not only the potential for rate savings but also the potential for enhanced reliability. The experience of Dominion North Carolina shows that significant savings can be achieved in net fuel and purchased power costs. In addition, the broad coordination of loads and resources on a regional basis can improve the grid's overall reliability.

IV. DEC'S REQUESTED COST OF CAPITAL IS EXCESSIVE, INTERNALLY INCONSISTENT AND SHOULD BE REJECTED

Q. ON WHAT REGULATORY AND LEGAL FRAMEWORK DO YOU BASE YOUR COST-OF-CAPITAL ANALYSIS?

A. A key tenet in the determination of just and reasonable rates is that owners of regulated companies must be afforded a reasonable opportunity to earn a fair return on their invested capital. Fair return is thus an essential component of a regulated company's cost of service.

In administrative law proceedings in the United States, the practice of determining "fair return" is guided by the landmark Supreme Court decisions in *Federal Power Commission et al. v. Hope Natural Gas Co.*, 320 U.S. 591 (1944) and *Bluefield Water Works & Improvement Co. v. Public Service Comm'n*, 262 U.S. 679 (1923). These decisions establish that fair return must be sufficient to attract capital and must compensate investors at a level consistent with returns on investments of comparable risk. In *Bluefield*, the Supreme Court held:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by

> corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures.

In *Hope*, the court found:

> [T]he return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and attract capital.

Rates of return that compensate investors for opportunity costs and permit utilities to attract capital are a cornerstone of regulatory practice in the United States.

Q. WHAT COST OF CAPITAL IS DEC SEEKING IN THIS PROCEEDING?

A. The testimony of DEC witness Robert Hevert recommends a Return on Equity (ROE) of 10.75 percent, which is at the high end of his range of 10.25 percent to 11.00 percent. His recommendation represents a proposed 55 basis point increase from the currently approved ROE of 10.20 percent.

Q. WHAT CAPITAL STRUCTURE IS DEC SEEKING IN THIS PROCEEDING?

A. DEC witness Stephen De May recommends a 53 percent equity ratio, arguing that that specific ratio minimizes the overall weighted-average cost of capital.

Q. HOW DOES DEC WITNESS HEVERT ARRIVE AT HIS COST OF CAPITAL RECOMMENDATION?

A. He performs financial analyses for a proxy group of twenty publicly-traded electric utility companies. He relies upon the results of these analyses together with his

judgment to identify a range of what he contends are reasonable returns and then selects a recommended ROE within the range.

Q. HAS DEC WITNESS HEVERT PROVIDED AN ANALYSIS OF THE RISKS OF DEC AS COMPARED TO THE RISKS OF THE UTILITIES IN HIS PROXY GROUP?

A. Yes. In his testimony, he cites four factors that he contends make DEC more risky than the proxy group. These are:

(1) DEC's comparatively high level of capital expenditures, particularly in light of the timing differences between investment and recovery;

(2) The risks and uncertainties associated with environmental regulation;

(3) The regulatory environment in which DEC operates; and

(4) Flotation costs.[23]

Q. IS IT APPROPRIATE FOR MR. HEVERT TO ASSIGN A HIGHER RISK PROFILE TO DEC AS COMPARED TO THE PROXY GROUP?

A. No. His analysis is purely based upon his judgment and is not tied in any way to objective metrics. A closer look at each of his points of differentiation shows that they are not justified.

(1) **Capital expenditures** – Mr. Hevert has not done any quantitative analysis to support this statement. In addition, he seemingly has not taken into consideration the proposed cost recovery rider for the Power/Forward Carolinas investments. If approved, it would be the largest capital tracker in the fifty states.

[23] See Hevert Direct, page 85.

(2) **Risks of environmental regulation** – Again, Mr. Hevert has not done any comparative analysis to support his contention that DEC faces higher risks than the proxy group.

(3) **Regulatory environment** – Once again, Mr. Hevert uses his judgement without any objective evidence from disinterested third parties. As I demonstrate below, the North Carolina regulatory environment is favorable relative to other states.

(4) **Flotation costs** – While Mr. Hevert is correct to identify flotation costs as a legitimate cost of service, all companies that raise equity capital in the markets face them. This is not a risk that is unique to DEC's parent and as such does not support his position that DEC is more risky than any of the proxy group companies. All proxy group companies face flotation costs.

Q. HAVE YOU ANALYZED DATA THAT CAN HELP THE COMMISSION TO DETERMINE THE RELATIVE RISK OF DEC AS COMPARED TO THE PROXY GROUP?

A. Yes. I have reviewed objective metrics in the course of the preparation of my testimony. These metrics indicate that DEC is less risky than the proxy group, not more risky, as elaborated below. Accordingly, the ROE Mr. Hevert recommends is excessive and should be rejected.

A. Duke Energy Has an Equity Ratio that is Among the Highest in the Proxy Group, Which Indicates Relatively Low Financial Risk

Q. HAVE YOU COMPARED DEC'S PROPOSED EQUITY RATIO TO THOSE OF PROXY GROUP OPERATING COMPANIES?

A. Yes, I have. Exhibit KGS-4 presents a comparison of DEC's proposed equity ratio to those of the proxy group companies. I compiled a list of all of the operating subsidiaries of the companies in the proxy group and restricted the analysis to those subsidiaries whose equity ratios had been approved by their respective state

Commission in the last three years. As illustrated in the exhibit, DEC's proposed equity ratio of 53.0% is on the high end of the spectrum, indicating low financial risk compared to the proxy group operating companies.

B. Duke Energy has a Higher Bond Rating than Most Proxy Group Companies, Which Indicates Less Risk

Q. HAVE YOU COMPARED THE BOND RATINGS FOR DEC TO THOSE OF PROXY GROUP OPERATING COMPANIES?

A. Yes, I have. I prepared two exhibits on bond ratings. Exhibit KGS-5 presents a comparison of DEC's Moody's Issuer Rating to those of the proxy group companies. NERA compiled a list of all of the operating subsidiaries of the companies in the proxy group and restricted the analysis to those subsidiaries that currently have a Moody's Issuer Rating in place. As illustrated in the exhibit, DEC's Moody's Issuer Rating of A1 is on the highest end of the spectrum, indicating low risk compared to the proxy group operating companies.

Exhibit KGS-6 compares DEC's Fitch Long-Term Issuer Default Rating to those of the proxy group companies. I compiled a list of all of the operating subsidiaries of the companies in the proxy group and restricted the analysis to those subsidiaries that currently have a Fitch Long-Term Issuer Default Rating in place. As illustrated in the exhibit, DEC's Fitch Long-Term Issuer Default Rating of A is on the highest end of the spectrum, indicating low risk compared to the proxy group operating companies. For this comparison, I used DEC's 2015 Fitch Long-Term Issuer Default Rating. I did so because Fitch has since withdrawn its ratings of

DEC. I did not see any evidence to suggest that this would not be the prevailing rating today.

Q. WOULD THE CONCLUSIONS FROM YOUR ANALYSIS OF BOND RATINGS BE DIFFERENT IF YOU HAD USED SENIOR UNSECURED BOND RATINGS INSTEAD OF ISSUER RATINGS?

A. No. My conclusion that DEC's bond ratings reflect low financial risk compared to the proxy group would not be different if I had used senior unsecured bond ratings because DEC's senior unsecured debt rating is either the same or higher than its issuer rating from each credit rating agency.

C. Duke Energy Corporation has the Least Risky Business Risk Ranking from Standard & Poor's

Q. HAVE YOU COMPARED BUSINESS RISK RANKINGS FROM S&P FOR DUKE ENERGY CORPORATION AND THE PROXY GROUP?

A. Yes. Exhibit KGS-7 illustrates S&P's business risk ranking for Duke Energy Corporation, DEC's parent, and the other parent companies of the proxy group. Duke maintains a ranking of "Excellent" from S&P, indicating very low business risk.

D. Duke Energy Corporation has Similar Financial Risk to the Parent Proxy Group Companies

Q. HAVE YOU COMPARED FINANCIAL RISK RANKINGS FROM S&P FOR DUKE ENERGY CORPORATION AND THE PROXY GROUP?

A. Exhibit KGS-8 illustrates S&P's financial risk ranking for Duke Energy Corporation (DEC's parent) and the other parent companies of the proxy group. Similar to nearly all the proxy group companies, Duke maintains a ranking of

"Significant" from S&P, indicating financial risk comparable to the proxy group companies. Based on S&P' financial risk rankings, it is clear that Duke is not more risky than the average parent proxy group company, from a holding-company financial risk perspective. This supports my finding that DEC presents lower financial risk than the proxy group companies, not a higher risk as Mr. Hevert contends.

E. North Carolina's Regulatory Risk Ranking is Favorable Relative to Other States

Q. DO YOU AGREE WITH MR. HEVERT'S CHARACTERIZATION OF THE REGULATORY ENVIRONMENT IN NORTH CAROLINA AS MORE RISKY THAN THAT FACING THE PROXY GROUP?

A. No. Exhibit KGS-9 illustrates Regulatory Research Associates' Commission rankings for state regulatory commissions. The rankings are determined by how constructive the regulatory environment is in that state, with Below Average/3 describing the most stringent Commissions and Above Average/1 describing the most supportive Commissions. This Commission, which sets the regulatory environment that DEC faces, is ranked towards the higher end of the spectrum, indicating that DEC operates in a more favorable regulatory environment compared to the proxy group operating companies. In addition, if DEC's proposed capital tracker for Power/Forward Carolinas is approved, it will provide an unusual level of risk mitigation. No other utility of which I am aware has a capital tracker in an amount permitting it to double its T&D rate base. In fact, only approximately one-third of the operating utilities in Mr. Hevert's group are permitted a regulatory pass

through of infrastructure investment. (Out of ninety-four OpCos, thirty-eight have trackers for classic infrastructure investments and fifty-six do not.) Based on the considerations described above, DEC's more favorable regulatory environment means DEC presents a lower level of risk compared to the proxy group companies.

Q. GIVEN THE EVIDENCE PRODUCED BY MR. HEVERT AND YOUR COMPARATIVE RISK ANALYSIS, WHAT IS A FAIR RETURN FOR DEC?

A. As discussed above, I disagree with Mr. Hevert's contention that DEC is relatively more risky than the proxy group. Accordingly, I conclude that the ROE range (10.25 percent to 11.00 percent) and specific recommendation (10.75 percent) he proposes are excessive and should be rejected. As is evident from Table 7 below, his recommendations are at the high end of his ROE estimates for the proxy group, while the top of his range is even above them.

Table 7: DEC Witness Hevert ROE Estimates by Model

Method	Hevert Estimate of Return on Equity
Constant Growth DCF	8.84%
Multi-Stage DCF	8.98%
Multi-Stage DCF w/ Current P/E Ratio	10.25%
CAPM w/ Average Bloomberg Beta Coefficient	9.39%
CAPM w/ Average Value Line Beta Coefficient	10.78%
Bond Yield Plus Risk Premium	10.11%

On balance, given this analysis, I recommend that the Commission reject the ROE requested by the Company in favor of a lower ROE more in line with the lower risk profile of the Company as demonstrated by objective measures and the higher

equity ratio DEC has sought. When determining where in this range to place the fair return, I anticipate the Commission will take into consideration the lower risk of DEC relative to proxy group companies and the industry generally.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

INDEX TO EXHIBITS

NERA
ECONOMIC CONSULTING

Kurt G. Strunk
Director

NERA Economic Consulting
1166 Avenue of the Americas
New York, New York 10036
Tel: +1 212 345 5035 Fax: 212-345-4650
Kurt.Strunk@nera.com
www.nera.com

KURT G. STRUNK
Director

Mr. Strunk is an expert in applied finance and energy matters with over 20 years of experience in complex commercial litigation, arbitration and regulatory proceedings. He has been retained as an expert to testify before arbitrators, the Federal Energy Regulatory Commission, US Tax Court, US Federal Court, and US Bankruptcy Court, the National Energy Board in Canada, as well as before state and provincial public utilities boards in the US and Canada. His testimonies have addressed the application of the just and reasonable rate standard, regulatory accounting, prudence, cost of service, regulatory reform, pipeline access, retail market issues, asset and contract valuation, cost of capital, as well as trading and risk management. He has served as an advisor in over fifty public utility tariff reviews.

In electric power, Mr. Strunk has advised governments, regulators, and energy companies on industry structure, regulation, and sector reform in North America, South America, Europe, Australia, Asia and Africa. He has worked extensively on matters related to all aspects of the electric power sector in the US and across the globe. In generation, Mr. Strunk recently co-authored a fairness opinion addressing a 6,300 MW nuclear power transaction in Ontario, Canada. He has advised a number of clients on the development of independent power contracts, fuel supply arrangements and competitive solicitations. With regard to transmission, he has advised on the design of transmission tariffs and on the design of electricity markets to encourage efficient transmission investment. He has advised on the electric sector reform program in Mexico and associated power market design, while also advising on capacity market design in US markets.

In the oil and gas sectors, Mr. Strunk has consulted on rate matters, mergers and acquisitions, restructurings, contract disputes, and product pricing. He has conducted numerous analyses of the procurement of fuels by electric generators. He served as an expert in regulatory hearings relating to pipeline tariffs in Canada and the United States. He has valued oil and gas assets and swaps in litigated disputes on behalf of major firms in the petroleum sector. He has also carried out studies of the reasonableness of gas supply agreements in various jurisdictions and assessed damages in connection with the early termination of such agreements.

Mr. Strunk's assignments often require that he determines the appropriate return on equity capital for energy firms. He has calculated and supported required rates of return for power generators, gas distribution utilities, electric distribution and transmission companies, and other energy firms in the context of traditional tariff reviews for regulated entities, litigation and advisory work. Mr. Strunk frequently collaborates with NERA's Securities and Finance Practice. He has addressed liability and damages in broker-dealer disputes, and in securities class actions.

Education

1997	**INSEAD (The European Institute of Business Administration), Fontainebleau, France** MBA, with Distinction, 1997
1993	**VASSAR COLLEGE,** **New York, USA** B.A., Economics, General and Departmental Honors

Career Details

2017-present	**NERA ECONOMIC CONSULTING** Director, New York
2012–2016	**NERA ECONOMIC CONSULTING** Vice President, New York
2005–2012	**NERA ECONOMIC CONSULTING** Senior Consultant, New York
2003–2004	**NERA ECONOMIC CONSULTING** Outside Consultant, New York
2000–2002	**NERA ECONOMIC CONSULTING** Senior Consultant, New York
1998–1999	**NERA ECONOMIC CONSULTING** Senior Analyst, New York
1996	**NERA ECONOMIC CONSULTING** Associate Analyst, New York
1994–1995	**NERA ECONOMIC CONSULTING** Research Associate, New York
1993–1994	**NERA ECONOMIC CONSULTING** Research Assistant, New York
1992	**GÉNÉRALE DE BANQUE** Research Assistant, Brussels

Languages

English: mother tongue

French: fluent
Spanish: fluent

Project Experience

EXPERT TESTIMONY

2017 **NV Energy**
Cost of Capital
Oral Testimony before the Nevada Public Utilities Commission, on behalf of Nevada Power Company, addressing the cost of capital for the Company, November 1, 2017.

2017 **Hawai‘i Electric Light**
Power Generation, Incentive Ratemaking, Fuel Adjustment Clauses
Rebuttal Testimony before the Hawai‘i Public Utilities Commission, on behalf of Hawai‘i Electric Light, addressing alternative incentive mechanisms for the Company’s power generation fleet and the reasonableness of the Company’s proposed ECAC. June 23, 2017.

2017 **NV Energy**
Cost of Capital
Direct Testimony before the Nevada Public Utilities Commission, on behalf of Nevada Power Company, addressing the cost of capital for the Company, June 5, 2017.

2017 **Public Utilities Commission of Texas**
Rebuttal Testimony before the Public Utilities Commission of Texas, on behalf of Southwestern Electric Power Company, addressing the prudence of retrofit investments in certain electricity generation facilities. May 19, 2017.

2017 **North Carolina Utilities Commission**
Direct Testimony before the North Carolina Utilities Commission, on behalf of North Carolina Sustainable Energy Association, addressing the Biennial determination of avoided cost rates for electric utility purchases from qualifying facilities, March 28, 2017.

2017 **NV Energy**
Cost of Gas / Prudence
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2017.

2016 **NV Energy**
Cost of Capital
Rebuttal Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, addressing the cost of capital for the Company's electric and gas divisions, September 23, 2016.

2016 **Hawai'i Electric Light**
Power Generation, Incentive Ratemaking, Fuel Adjustment Clauses
Direct Testimony before the Hawai'i Public Utilities Commission, on behalf of Hawai'i Electric Light, addressing alternative incentive mechanisms for the Company's power generation fleet and the reasonableness of the Company's proposed ECAC. September 19, 2016.

2016 **NV Energy**
Cost of Capital
Certification Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, addressing the cost of capital for the Company's electric and gas divisions, August 2, 2016.

2016 **NV Energy**
Cost of Capital
Direct Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, addressing the cost of capital for the Company's electric and gas divisions, June 6, 2016.

2016 **PacifiCorp**
Cost of Capital
Oral Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's expedited rate filing (Docket UE-152253), May 2, 2016.

2016 **Confidential Client**
Damages under Wind Power Purchase Agreement
Expert Report in arbitration on the valuation of damages under a PPA backed by a wind farm, with a particular focus on the reasonableness of the liquidated damages cap, April 25, 2016.

2016 **Municipality of Anchorage (ML&P), Chugach Electric Association**

Valuation of Gas Field and Reasonableness of Acquisition Price
Oral Testimony before the Regulatory Commission of Alaska on the reasonableness of the proposed acquisition of ConocoPhillips' working interest in the Beluga River Unit, April 19, 2016.

2016 **PacifiCorp**
Cost of capital
Rebuttal Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's expedited rate filing (Docket UE-152253), April 7, 2016.

2016 **NV Energy**
Cost of Gas / Prudence
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2016.

2016 **Alliance to Protect Nantucket Sound**
Financing of off-shore wind farm
Oral Testimony before the Energy Facilities Siting Board of the Commonwealth of Massachusetts on the financeability of the Cape Wind project, January 25, 2016.

2015 **PacifiCorp**
Cost of capital
Direct Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital, November 24, 2015.

2015 **Chugach Electric Association, Inc.**
Regulatory principles for attributing found natural gas
Oral testimony before the Regulatory Commission of Alaska, addressing the regulatory treatment of gas found by the Cook Inlet Natural Gas Storage Alaska LLC, August 31, 2015.

2015 **Baltimore Gas & Electric Company**
Risks and rate of return for retail electricity business
Oral Testimony before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash*

Working Capital for Standard Offer Service, Case No. 9221, August 5, 2015.

2015 **Baltimore Gas & Electric Company**
Risks and rate of return for retail electricity business
Rebuttal Testimony before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash Working Capital for Standard Offer Service*, Case No. 9221, July 22, 2015.

2015 **Chugach Electric Association, Inc.**
Regulatory principles for attributing found natural gas
Pre-filed testimony before the Regulatory Commission of Alaska, addressing the regulatory treatment of gas found by the Cook Inlet Natural Gas Storage Alaska LLC, June 5, 2015.

2015 **ATX Southwest, LLC.**
Cost of Capital
Direct Testimony before the Federal Energy Regulatory Commission, on behalf of ATX Southwest, addressing return on equity, May 28, 2015.

2015 **Chugach Electric Association, Inc.**
Cost of Capital
Responsive Testimony before the Regulatory Commission of Alaska, addressing return on equity for the Enstar Natural Gas Company, May 15, 2015.

2015 **Baltimore Gas & Electric Company**
Risks and rate of return for retail electricity business
Testimony before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash Working Capital for Standard Offer Service*, Case No. 9221, April 22, 2015.

2015 **NV Energy**
Cost of Gas / Prudence
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2015.

2014	**PacifiCorp** **Cost of capital** Oral Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's general rate case, December 16, 2014.
2014	**PacifiCorp** **Cost of capital** Rebuttal Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's general rate case, November 21, 2014.
2014	**PacifiCorp** **Cost of capital** Direct Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's general rate case, including the effects of transitioning away from coal, April 30, 2014.
2014	**Nevada Power Company** **Cost of capital** Direct Testimony before the Nevada Public Utilities Commission, on behalf of Nevada Power Company, on the cost of capital in the Company's general rate case, April 30, 2014.
2015	**NV Energy** **Cost of Gas / Prudence** Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2014.
2013	**Sierra Pacific Power Company** **Cost of capital** Oral testimony, before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, on the cost of capital for the gas and electric divisions in the Company's general rate case, October 7, 2013.
2013	**Sierra Pacific Power Company** **Cost of capital** Rebuttal Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, on the cost of capital for the gas and electric divisions in the Company's general rate case, September 25, 2013.

2013 **Market Area Shippers**
(Gaz Métro, Union Gas and Enbridge Gas Distribution)
Contract Renewal Alternatives for Regulated Pipeline Service
Pre-filed Expert Report, with Jeff Makholm, before the National Energy Board of Canada, in the Matter of TransCanada's Application for Tariff Amendments, Hearing Order RH-001-2013, July 26, 2013.

2013 **Sierra Pacific Power Company**
Cost of capital
Direct Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, on the cost of capital for the gas and electric divisions in the Company's general rate case, June 4, 2013.

2013 **NV Energy Operating Companies**
Cost of capital
Direct Testimony before the Federal Energy Regulatory Commission, on behalf of NV Energy Operating Companies, on the appropriate rate of return for the consolidated transmission system, May 31, 2013.

2013 **Public Intervenor**
Wholesale Margins for Regulated Motor Fuels and Heating Oil
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of an Application by Irving Oil Marketing GP and Irving Oil Commercial GP requesting an increase in the wholesale margins for motor fuels and heating oil*, January 29, 2013.

2013 **Public Intervenor**
Power sector modelling, deferral account policy, financial analysis
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of the Point Lepreau Nuclear Generating Station Deferral Account and Section 143.1 of the Electricity Act*, January 15, 2013.

2012 **Baltimore Gas & Electric Company**
Potomac Electric Power Company
Power Purchase Agreements, Retail electric competition
Oral testimony before the Maryland Public Service Commission *In the Matter of Whether New Generation Resources Are Needed to Meet Long-Term Demand for Standard Offer Service*, Case No. 9214, November 26, 2012.

2012 **Public Intervenor**
Modelling of coal and oil plants, deferral account, financial analysis
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board *In the Matter of the Point Lepreau Nuclear Generating Station Deferral Account and Section 143.1 of the Electricity Act*, November 26, 2012.

2012 **Nevada Power Company**
Cost of capital
Pre-filed testimony before the Federal Energy Regulatory Commission in the Nevada Power Company's Transmission Rate Case, October 31, 2012.

2012 **Public Intervenor**
Wholesale margins for regulated motor fuels and heating oil
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board In the Matter of an Application by Irving Oil Marketing G.P. and Irving Oil Commercial G.P. Requesting an Increase in the Wholesale Margins for Motor Fuels and Heating Oil, October 26, 2012.

2012 **Nevada Power Company**
Prudence of gas costs for 2012
Pre-filed Expert Report before the Nevada Public Utilities Commission *In the Nevada Power Company's 2012 Deferred Energy Filing*, March 1, 2012.

2012 **Sierra Pacific Power Company**
Prudence of gas costs for 2012
Pre-filed Expert Report before the Nevada Public Utilities Commission *In the Nevada Power Company's 2012 Deferred Energy Filing*, March 1, 2012.

2011 **Public Intervenor**
Power system loss factors, OATT, transmission regulatory policy
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board *In the Matter of a Review of the Proposed Change to the New Brunswick System Operator's Real Power Loss Fact*or, October 31, 2011.

2011 **John Hancock**
Risk analysis of European power plant leveraged lease
Oral Testimony before the U.S. Tax Court, on behalf of plaintiff in *John Hancock Life Insurance Company and Subsidiaries v. Commissioner of Internal Revenue*, October 24, 2011.

2011 **John Hancock**
Risk analysis of European power plant leveraged lease
Rebuttal Expert Report before the U.S. Tax Court, on behalf of plaintiff in *John Hancock Life Insurance Company and Subsidiaries v. Commissioner of Internal Revenue*, August 19, 2011.

2011 **John Hancock**
Risk analysis of European power plant leveraged lease
Pre-filed Expert Report before the U.S. Tax Court on behalf of plaintiff in *John Hancock Life Insurance Company and Subsidiaries v. Commissioner of Internal Revenue*, July 8, 2011.

2011 **Public Intervenor**
OATT, transmission regulatory policy
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Review of the Proposed Changes to the New Brunswick System Operator's Open Access Transmission Tariff*, February 21, 2011.

2011 **Public Intervenor**
Power system loss factor, OATT, transmission regulatory policy
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Review of the New Brunswick System Operator's Proposed Change to its Loss Factor*, February 3, 2011.

2011 **Baltimore Gas & Electric Company**
Risks and rate of return for retail electricity business
Oral testimony before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash Working Capital for Standard Offer Service*, Case No. 9221, January 20, 2011.

2010 **Baltimore Gas & Electric Company**
Risks and rate of return for retail electricity business
Pre-filed Expert Report before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash Working Capital for Standard Offer Service*, Case No. 9221, September 17, 2010.

2010 **Public Intervenor**
Greenfield gas distributor, cost of service, just and reasonable rates
Oral testimony before the New Brunswick Energy & Utilities Board, in the *Enbridge Gas New Brunswick Rate Case*, March 30, 2010.

2010 **Public Intervenor**
Greenfield gas distributor, cost of service, just and reasonable rates
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Matter of Enbridge Gas New Brunswick Rate Case*, March 12, 2010.

2009 **Public Intervenor**
Greenfield gas distributor, cost of service, just and reasonable rates
Oral testimony before the New Brunswick Energy & Utilities Board, *in the Review of Matters related to the Regulation of Enbridge Gas New Brunswick*, October 23, 2009.

2009 **Public Intervenor**
Greenfield gas distributor, cost of service, just and reasonable rates
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Matter of the Annual Financial Review of Enbridge Gas New Brunswick Limited Partnership*, August 21, 2009.

2009 **Public Intervenor**
Greenfield gas distributor, cost of service, just and reasonable rates
Oral testimony before the New Brunswick Energy and Utilities Board, *in the Matter of the Annual Financial Review of Enbridge Gas New Brunswick Limited Partnership*, September 15, 2009.

2009 **Public Intervenor**
Greenfield gas distributor, cost of service, just and reasonable rates
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Matter of a Review of Matters Related to the Regulation of Enbridge Gas New Brunswick Limited Partnership*, September 21, 2009.

2009 **The City of New York**
Cost of service, incentives and taxi lease rates
Oral testimony in the District Court for the Southern District of New York in *Metropolitan Taxicab Board of Trade et al. v. The City of New York et al.*, on the issue of whether the Taxi and Limousine Commission's new maximum lease rates constitute a fuel efficiency and emissions mandate that would be preempted by Federal law, May 20, 2009.

2009 **The City of New York**
Cost of service, incentives and taxi lease rates
Pre-filed expert Report in the United States District Court for the Southern District of New York in *Metropolitan Taxicab Board of Trade et al. v. The*

City of New York et al., on the issue of whether the Taxi and Limousine Commission's new maximum lease rates constitute a fuel efficiency and emissions mandate that would be preempted by Federal law, May 18, 2009.

2009 **Public Intervenor**
Greenfield gas distributor, cost of service, just and reasonable rates
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of the examination of the formula for Enbridge Gas New Brunswick's market-based rate,* April 23, 2009.

2009 **Public Intervenor**
Greenfield gas distributor, cost of service, just and reasonable rates
Pre-filed Report before the New Brunswick Energy and Utilities Board, *In the Matter of the examination of the formula for Enbridge Gas New Brunswick's market-based rate,* March 26, 2009.

2009 **Public Intervenor**
Cost of service, ISO management, OATT transmission policy
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of the application of the New Brunswick System Operator for changes to its Charges, Rates and Tolls,* March 18, 2009.

2009 **Public Intervenor**
Cost of service, ISO management, OATT transmission policy
Pre-filed Report before the New Brunswick Energy and Utilities Board, *In the Matter of the application of the New Brunswick System Operator for changes to its Charges, Rates and Tolls,* February 24, 2009.

2008 **Allegheny Power, Baltimore Gas & Electric**
Integrated resource planning, competitive retail electric markets
Oral testimony before the Maryland Public Service Commission, *in the Matter of the Commission's Investigation Of Investor-Owned Electric Companies' Standard Offer Service for Residential and Small Commercial Customers in Maryland,* Case No. 9117, December 15, 2008.

2008 **Allegheny Power, Baltimore Gas & Electric**
Integrated resource planning, competitive retail electric markets
Pre-filed Report before the Maryland Public Service Commission, *in the Matter of the Commission's Investigation Of Investor-Owned Electric*

Companies' Standard Offer Service for Residential and Small Commercial Customers in Maryland, Case No. 9117, October 1, 2008.

2008 **Public Intervenor**
Ratemaking for greenfield gas distributor
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of an application by Enbridge Gas New Brunswick for changes to its Charges, Rates and Tolls,* March 27, 2008.

2008 **Public Intervenor**
Ratemaking for greenfield gas distributor
Pre-filed Report before the New Brunswick Energy and Utilities Board, *In the Matter of an application by Enbridge Gas New Brunswick for changes to its Charges, Rates and Tolls,* March 10, 2008.

2007 **Public Intervenor**
Prudence, just and reasonable standard, affiliate transactions
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls,* December 18, 2007.

2007 **Public Intervenor**
Nuclear power plant Cost of Service
Pre-filed Report before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls,* December 7, 2007.

2007 **Public Intervenor**
Prudence of power generation costs
Pre-filed Report before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls,* November 5, 2007.

2007 **Public Intervenor**
Prudence of power generation costs
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls,* June 21, 2007.

2007 **Public Intervenor**
Prudence of power generation costs
Pre-filed Report before the New Brunswick Energy and Utilities Board, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls,* June 14, 2007.

2006 **Brookfield Energy Marketing Inc.**
Valuation of power purchase agreement and power plant
Deposition testimony before the United States Bankruptcy Court for the District of Maryland, on behalf of Brookfield Energy Marketing Inc., *In re: USGen New England, Inc.*, Debtor, Case No. 03-30465, May 22, 2006.

2006 **Brookfield Energy Marketing Inc.**
Valuation of power purchase agreement and power plant
Rebuttal Report before the United States Bankruptcy Court for the District of Maryland, on behalf of Brookfield Energy Marketing Inc., *In re: USGen New England, Inc.*, Debtor, Case No. 03-30465, May 5, 2006.

2006 **Brookfield Energy Marketing Inc.**
Valuation of power purchase agreement and power plant
Expert Report before the United States Bankruptcy Court for the District of Maryland, on behalf of Brookfield Energy Marketing Inc., *In re: USGen New England, Inc.*, Debtor, Case No. 03-30465, March 29, 2006.

2006 **Public Intervenor**
Application of the prudence standard to affiliate transactions
Oral testimony before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls*, March 14, 2006.

2006 **Public Intervenor**
Application of the prudence standard to affiliate transactions
Pre-filed Report with Eugene Meehan before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls,* January 31, 2006.

2005 **Dayton Power & Light Company**
Retail pricing for default service customers and option valuation
Oral testimony at hearings in Ohio Public Utilities Commission Case No. 05-276-EL-AIR, November 8 and 14 2005.

2005 **Dayton Power & Light Company**
Retail pricing for default service customers and option valuation
Deposition testimony in Ohio Public Utilities Commission Case No. 05-276-EL-AIR, November 8, 2005.

2005 **Dayton Power & Light Company**
Retail pricing for default service customers and option valuation
Testimony in Ohio Public Utilities Commission, in Support of Stipulation filed in support of Dayton's proposed settlement Case No. 05-276-EL-AIR, November 4, 2005.

2005 **Dayton Power & Light Company**
Retail pricing for default service customers and option valuation
Rebuttal testimony in Ohio Public Utilities Commission, application of financial options pricing techniques to assess the reasonableness of Dayton's proposed provider-of-last-resort charges, Case No. 05-276-EL-AIR, October 31, 2005.

2004 **Board of Public Utilities**
Cost of capital
Pre-filed testimony with Cindy Ma before the Board of Public Utilities, Newfoundland and Labrador, Canada, on "The Cost of Capital for Automobile Insurance Firms," October 13, 2004.

CONSULTING EXPERT EXPERIENCE

2016 **Confidential Client**
Valuation of Solar Generation Facilities
Expert in dispute related to the valuation of rooftop solar facilities.

2014 -Present **Confidential Client**
Offshore Exploration and Production Permit Arbitration
Expert in dispute related to an agreement between two firms to develop an offshore gas field in New Zealand in arbitration at the ICC International Court of Arbitration.

2013–Present **Gaz Métro**
Cost Recovery of Gas Distribution System Upgrade
Advised client on regulatory merits of ratemaking for distribution system upgrade. Performed survey of ratemaking policies for similar upgrades in other jurisdictions in connection with proceeding before Provincial regulator.

2014-Present **Confidential Client**
Gas Supply Agreement Negotiation
Advise on cost of service and LNG contract price issues in Australia.

2014- Present **Alliance Pipeline**
Restructuring of services and tolls
Advised on Alliance's restructuring proposal in a matter before the National Energy Board. Supervised modelling of pipeline tolls and assessment of natural gas pipeline market power.

2014-2015 **Gazprom OAO**
Civil dispute involving gas field development and LNG importation
Supervised modelling of LNG netback prices and damage calculations in preparation for a jury trial before a Tarrant County, Texas District Court. Consulted with respect to a dispute between a U.S oil company and Russian oil company regarding ownership of a Russian gas field, tortious interference, and trade secret misappropriation with regards to a plan to import LNG into the United States in the mid-2000s.

2014 **FortisBC Energy Inc**
Tolling for pipeline in Canada

Analyzed toll methodology and advised on regulatory issues related to a tolling proposal of NGTL's North Montney Mainline, an extension of the existing NGTL Alberta System.

2014 **Royal Bank of Canada**
Gas Supply Agreement Dispute
Served as consulting expert in a gas supply agreement dispute between RBC and three municipal gas distributors in Nevada and Iowa. Case involved analysis of Basel III regulations, capital requirements, commodity swaps and interest rate swaps.

2013 **Confidential client**
Valuation and pricing analysis
Performed valuation and pricing analysis for oil pipeline dispute in Texas. Provided advice to outside counsel throughout litigation.

2012-2014 **ATCO Gas & ATCO Electric**
Cost of Service / Capital Trackers
Provided expert review of ATCO Gas and ATCO Electric's capital tracker proposals, including a survey of capital trackers in other jurisdictions.

2012–2013 **Confidential client**
Valuation of oil pipeline company and its hedging positions
Performed valuation of oil pipeline company and its hedging positions in litigation involving an alleged breach of fiduciary duty. Provided advice to outside counsel throughout litigation.

2012–2013 **Confidential client**
Approaches to regulatory accounting and cost-of-service regulation
Contributed to study assessing benefits of various approaches to regulatory accounting and cost-of-service regulation for pipelines.

2011–2013 **Confidential client**
Possible outcomes of power contract disputes
Analyzed potential litigation and settlement outcomes in a series of power contract disputes. Provided advice to outside counsel.

2011–2012 **Confidential client**
Oil pipeline cost of service and depreciation policies
Advised counsel to a shipper in an intrastate oil pipeline company rate case before the Kansas Corporation Commission.

2011	**Confidential client** **Antitrust aspects of a proposed pipeline merger** Analyzed antitrust aspects of oil pipeline combinations in connection with a proposed merger. Provided advise to outside counsel.
2010–2011	**Confidential client** **Valuation of generation assets** Performed valuation of power plant in context of alleged expropriation.
2010	**Hydro Québec, Canada** **Grid connection and upgrade cost policy** Analyzed grid connection and upgrade cost policy. Evaluated existing policy to allocate costs of grid upgrades to generation developers and system users. Suggested modifications to policy. Prepared benchmarking analysis comparing the company's practices to those of over a dozen other entities in North America.
2008	**Confidential client** **Allegations of energy market manipulation** Advised on the evaluation of allegations of energy market manipulation in the context of physical electricity trades in RTO-managed markets.
2007	**Confidential client** **Valuation of valuation of long-dated oil warrants** Performed valuation of long-dated oil warrants priced off Venezuelan crude oil in context of damages calculation.
2006	**Confidential client** **Damages valuation in securities class action** Valued damages in a securities class action related to the bankruptcy of an energy retailer.
2003-2004	**Confidential client** **Bid process advantages: generation pricing and transmission costs** Contributed to testimony on behalf of a large electric utility regarding an affiliate transaction that resulted from a competitive solicitation. Testimony before FERC focused on whether the affiliate was advantaged during the bid process, both with respect to generation pricing and electric transmission cost.
2003	**Confidential client** **Valuation, economic, accounting, and hedging analysis**

Performed valuation, economic, accounting, and hedging analysis of a gas-fired power plant in an international arbitration matter.

2002 **Confidential client**
Prudence of forward power purchases
Contributed to testimony on behalf of an electric utility regarding the prudence of forward power purchases during the Western power crisis.

2002–2003 **Pacific Gas & Electric**
Valuation of Damages Due to Gas Pipeline Capacity Withholding
Performed analyses of damages from withheld pipeline capacity into California. Analyses led to $1 billion settlement.

2002–2003 **Confidential client**
Prudence of forward power purchases
Contributed to testimony regarding the prudence of Department of Water Resources's forward power purchases during the Western power crisis.

2002 **Confidential client**
Electric and gas hedging strategies for its generation assets
Contributed to testimony on behalf of an energy marketing and trading firm regarding electric and gas hedging strategies for its generation assets, including an examination of the nature of competition among energy marketing and trading firms and strategies.

2001–2002 **Pacific Gas & Electric Company**
FERC refund and other related proceedings
Analysis and support to a California utility in the context of the FERC refund and other related proceedings, 2001-2002.

2001–2002 **Pacific Gas & Electric Company**
Value of a long-term affiliate power sales agreement
Contributed to testimony before FERC relating to the value of a long-term affiliate power sales agreement. Involved analysis and valuation of over 100 long-term power contracts in the context of this benchmarking analysis.

2001 **Confidential client**
Valuation of a passive equity interest
Contributed to testimony on behalf of a leading US energy company regarding the valuation of a passive equity interest in an IPP project in El Salvador.

2001	**Baltimore Gas & Electric Company** **Business separation of Constellation Energy Group** Contributed to testimony submitted to the Public Service Commission of Maryland on the business separation of Constellation Energy Group.
1998	**Baltimore Gas & Electric Company** **Valuation of generation assets** Performed valuation of Baltimore Gas & Electric Company's hydro, nuclear, coal and gas-fired generation assets in the context of stranded cost calculations during restructuring, 1998.
1995–1996	**Confidential client** **Analysis of market concentration** Performed HHI analyses to support testimony presenting a competitive assessment of the Western electric generation market in the US, 1995-1996.
1994–1995	**Confidential client** **Damages valuation in securities class action** Estimated losses and alleged damages for several mutual funds that invested in derivative securities.
1994–1995	**Confidential client** **Damages valuation in securities class action** Estimated losses and alleged damages for several mutual funds that invested in derivative securities.
1994	**Goldman Sachs** **Default risk studies on fixed income instruments** Prepared default risk studies on fixed income instruments for counsel to Goldman Sachs in a broker/dealer arbitration.
1994	**Confidential client** **Damages valuation in securities class action** Consulted to counsel for an infomercial company on materiality, liability, and damages in a shareholder class action suit.
1993	**Confidential client** **Damages valuation in securities class action** Assessed materiality and damages in a 10b-5 class action against a major pharmaceutical company.

ADVISORY PROJECTS

2017 **Leveraged Lease tied to Power Plant**
Due Diligence for Prospective Acquirer
Retained by a confidential acquirer to evaluate a target utility-related investment. Provided strategic advice and due diligence relating to the financial valuation and post-acquisition benefits.

2016 **Utility Merger**
Due Diligence for Prospective Acquirer
Retained by a confidential acquirer to evaluate a target utility and prospective merger benefits. Provided strategic advice and due diligence relating to the financial and regulatory implications of the acquisition.

2016 **Wind Power Transaction**
Due Diligence for Prospective PPA Offtaker
Retained by a confidential offtaker to evaluate the costs, benefits and risks associated with a prospective long-term power purchase transaction backed by a wind farm.

2016 **Electric Utility Acquisition**
Due Diligence for Prospective Acquirer
Retained by a confidential equity investor to evaluate load risk associated with the prospective acquisition of an interest in a regulated electric utility. Focused on risks around load forecast.

2015 **Southern Star Central Gas Pipeline**
Due Diligence for Prospective Acquirer
Retained by a confidential equity investor to evaluate regulatory and investment risk associated with the prospective acquisition of an interest in Southern Star. Analyzed likely outcomes in the pipeline's upcoming rate case.

2015 **Independent Electricity System Operator (IESO)**
Reasonableness of 6,300 MW Power Transaction
Retained by IESO in Ontario, Canada, to prepare, together with a team of NERA experts, an Opinion as to the Fairness of the Amended and Restated Bruce Power Refurbishment Implementation Agreement.

2015 **ESKOM, South Africa**
Regulatory Strategy for Cost Recovery
Retained by ESKOM to advise on regulatory strategy, treatment of coal-plant operation and associated fuel costs, delays in unit online dates and other regulatory issues.

2014	**Hawaiian Electric Company** **Fuel Adjustment Clause and Oil Hedging** Retained by Hawaiian Electric Company to provide analysis regarding the efficiency incentives embedded in the company's fuel adjustment clause (ECAC). Analyzed the possibility of hedging oil price volatility through commercially-available contracts.
2014	**Confidential Client** **Pricing Principles for Domestic Gas Reservation Policy** Formulated a methodology to determine a schedule of reasonable prices using a cost of service approach for gas that the company is obligated to market under the domestic gas supply policy.
2012/2013	**Atlantic Path 15** **Due Diligence Study for Confidential Potential Buyer** Performed regulatory due diligence in connection with the potential acquisition of Atlantic Path 15 transmission assets. Evaluated the regulatory climate at FERC and analyzed FERC decisions from prior rate cases, with a focus on allowed rate of return. Used NERA rate-of-return models to replicate the FERC methodology and to predict the rate-of-return to be allowed by FERC in the next rate case.
2013	**Energy trading entity** **Price risks and electricity transmission development** Retained by energy trading entity to perform an independent study of price risks and electricity transmission development in the ERCOT market.
2013	**Electric industry client** **Reactive power compensation** Retained by electric industry client to analyze electricity transmission tariffs and reactive power compensation in competitive electric markets.
2012/2013	**New Mexico Natural Gas Company** **Due Diligence Study for Confidential Potential Buyer** Performed regulatory due diligence in connection with the potential acquisition of New Mexico Natural Gas. Assessed hurdles to getting the transaction approved by regulatory authorities. Analyzed recent rate actions by the state commission and the likely outcomes of future cases.
2012	**Oil industry client** **Regulation benchmarking in downstream oil sector** Retained by oil industry client to advise on margins and to perform an international benchmarking of the regulation of the downstream oil sector.

2012 **Hawaiian Electric Company**
Hedging and rate stabilization
Retained by Hawaiian Electric Company to provide analysis regarding hedging of fuel oil and diesel fuel purchases in order to stabilize customer rates.

2011 **Confidential client**
Implications of CFTC proposed definition of swap dealer
Advised on margin, capital and reporting implications of CFTC proposed definition of swap dealer under Dodd Frank.

2010 **Confidential client**
Leveraged lease transaction
Provided litigation support services with respect to a dispute over a leveraged lease transaction.

2010 **Confidential client**
Valuation, risk assessment and analysis of offtake contract options
Performed detailed valuation, risk assessment and analysis of offtake contract options for a hydroelectric power plant.

2009 **Potomac Edison Company**
Capital investment planning
Performed least-cost capital investment planning on behalf of the Potomac Edison Company.

2009 **Government of New Brunswick, Canada**
Advised on asset valuation
Advised on inputs into the valuation of NB Power's generation fleet, including the Point Lepreau Nuclear Generation Station in connection with the potential sale of NB Power to Hydro Québec. Coordinated assumptions with financial advisor for fairness opinion.

2009 **Energy East**
Cost of capital
Advised on rate-of-return issues for electricity distributors in New York State.

2008 **Confidential client**
Contract design
Advised on design of structured contract for new wind power plant, new electricity transmission lines and associated RFPs.

2008	**Commission for Energy Regulation** **Review of SOLR tariffs** Advise the Commission for Energy Regulation on the review of SOLR tariffs in the Republic of Ireland.
2008	**Comisión Nacional de Energía** **Market mechanisms for distributions to serve default customers** Advised on design and implementation of market mechanisms by which Spanish distribution utilities buy energy to serve default customers.
2006–2009	**Hawaiian Electric Company** **Hedging options for fuel** Performed economic and accounting analysis of hedging options for low sulfur fuel oil, diesel and fuel oil on behalf of Hawaiian Electric Company.
2004–2010	**Commonwealth Edison and Ameren's Illinois utilities** **Competitive procurement for power supply** Advised Commonwealth Edison and Ameren's Illinois utilities on the design of a competitive procurement for short- and long-term power supply, including the contractual framework for energy purchases, 2004 to 2010.
2004–Present	**New Jersey and Maryland distribution utilities** **Mark-to-market issues and credit policies** Advised several utilities in the Eastern Interconnection on mark-to-market issues and credit policies.
1999–2008	**New Jersey distribution utilities** **Contract design and implementation** Worked with credit representatives of New Jersey distribution utilities on contract design and implementation of the contract credit terms. Coordinated the utilities' responses to changes to the forms of letters of credit proposed by bidders; oversaw bidder credit qualification process; managed approval process for alternate guaranty instruments, and served as advisor to utilities when contract interpretation issues arose, 1999 to 2008.
1999–2008	**FirstEnergy Companies** **Competitive procurement for power supply** Advised the FirstEnergy Companies on the design of a competitive procurement for intermediate term power supply, including the contractual framework for energy purchases, 2004-2005.

2003 **Commission for Energy Regulation**

Hedging agreement and a power plant construction agreement
Advised the Commission for Energy Regulation in Ireland on the structure of a long-term hedging agreement and a power plant construction agreement; assisted with the development of the hedging contract and the tender documentation; performed bid evaluation.

2002 **Sierra Pacific Resources**

Risk management strategies
Advised a major west coast utility in the US on the development of its risk management policy and procedures; reviewed past trading and risk management strategies; and performed an assessment of its risk measurement and reporting techniques, including credit risk management policy.

2000 **Ministry of Energy, México**

Mexican IPP solicitation program
Advised on the development of the Mexican IPP solicitation program, including transaction structure (IPP v. BLT v. BOT), credit risk management, model contracts, and bid evaluation (the Comisión Federal de Electricidad has procured as much as 2000 MW per year of long-term power supply from IPPs).

2000 **Comisión Federal de Electricidad, Mexico**

Credit and collateral requirements for a power purchase agreement
Advised the Comisión Federal de Electricidad in Mexico on credit and collateral requirements for an-asset backed power purchase agreement with an IPP based in Mexico, including advice on the development of comparable credit and collateral requirements for an import transaction that was to be made on a firm basis with liquidated damages.

1998–2000 **Ministry of Energy, Mexico**

Restructuring and privatization of the Mexican electricity sector
Consulted to the Mexican Ministry of Energy on the restructuring and privatization of the Mexican electricity sector, the design of a competitive spot market, and the policy of IPP solicitations, electricity transmission pricing, upstream gas pricing and the development of a regulatory framework for the sector.

1998–1999 **Ministry of Energy, Mexico**

Assessing competition in restructured Mexican electric generation
Contributed to study assessing competition in restructured electric generation market in Mexico.

1999	**Swiss Re** **Novel insurance packages to hedge electric price and operations risk** Assisted Swiss Re in the development of the modeling for the creation of novel insurance packages to hedge electric price and operations risk, 1999.
1998	**Iberdrola S.A., Spain** **Seminars on the deregulated markets for gas and electricity in the US** Designed and conducted a series of three training courses for representatives of Iberdrola S.A. (Spain's principal private utility), which consisted of seminars on the deregulated markets for gas and electricity in the US, followed by a series of interviews with large utilities, IPPs, and energy marketers. Courses were designed to provide the European traders with an understanding of best practices employed by energy traders in the US, with respect to risk management (credit, market, and operational), 1998.
1998	**C.E.L.P.E, Brazil** **Risk management and energy trading** Assisted in training senior management of Iberdrola's Brazilian subsidiary C.E.L.P.E. in the area of risk management and energy trading.
1998–2000	**Baltimore Gas & Electric Company** **Sector restructuring** Consultant to Baltimore Gas & Electric Company on sector restructuring.
1998–1999	**Baltimore Gas & Electric Company** **Market value estimates of generation fleet** Assisted in developing market value estimates of Baltimore Gas & Electric Company's generation fleet, including Calvert Cliffs Nuclear Power Plant,.
1998	**Confidential Client** **Generation and fuel strategy** Participated in the development of a generation and fuel strategy for a large merchant generator and energy trader.
1996	**Iberdrola, S.A, Spain** **Restructuring of the electricity sector** Consultant to Iberdrola, S.A. on issues relating to the restructuring of the electricity sector in Spain.
1996	**Confidential client** **Investment strategy**

Consultant to a major southeastern electric utility on investment strategy in the US.

1996 **Confidential client**
Competitive analysis of electric generation
Performed competitive analysis of electric generation market for utilities in eastern US.

1996 **New York State Electric and Gas Company**
Restructuring of the electricity market in New York State
Consultant to the New York State Electric and Gas Company on issues relating to the restructuring of the electricity market in New York State.

1995–1996 **New York Power Authority**
Sector restructuring
Consultant to senior management of the New York Power Authority on issues relating to the New York Competitive Opportunities Docket.

1995 **Southern California Edison Company**
Proposed restructuring of California's electric services industry
Consultant to Southern California Edison Company on issues relating to the California Public Utilities Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation.

Publications and Presentations

2017 **Electricity Journal**
Beyond net metering: A model for pricing services provided by and to distributed generation owners.
April 2017.

2017 **Law Seminars International Electric Utility Rate Case Conference**
Beyond Net Metering: Ratemaking Challenges from Distributed Generation.
Las Vegas, March 16 2017.

2017 **Public Utilities Fortnightly**
Interest Rates After the Election: What They Mean for Public Utility Returns.
January 2017.

2016	**Perusahaan Gas Negara** Provided in-depth training on regulatory practice and tariff design for gas pipelines and distribution companies. December 2016.
2016	**Electricity Journal** Low interest rates and unprecedented stock market volatility: What they mean for your next rate case. January-February 2016.
2016	**An Economic Analysis of the Acquisition of ConocoPhillips' Interest in the Beluga River Unit,** A Report Prepared for Chugach Electric Association, Inc. and Anchorage Municipal Light and Power, March 11, 2016.
2016	**Law Seminars International, 12th Annual National Conference on Current Issues in Electric Utility Ratemaking** Policy Options to Address Cross Subsidies from Self Generation, March 14, 2016
2016	**International Arbitration Group of International Law Firm** Applications of Economic Analysis in International Arbitration (with a focus on the Energy Sector) New York, January 12, 2016
2015	**The Electricity Journal** Low interest rates and unprecedented stock market volatility: What they mean for your next rate case December, 2015
2015	**Utility Regulation Conference: Rate Case, ROE, and Reliability** Brave New World for Return on Equity Washington DC, December 10-11, 2015
2015	**Law Seminars International, Energy in the Northeast** Energy Sector Developments and the Cost of Capital Boston, September 29, 2015
2015	**Law Seminars International, Rate Case Conference** A Brave New World for Return on Equity Las Vegas, March 5, 2014
2014	**Law Seminars International, Rate Case Conference** Current Challenges in Determining Appropriate Rates of Return for Public

Utilities
Las Vegas, February 28, 2014

2014 **National Energy Agency (China) and representatives of the State Grid**
Regulatory Accounting and the FERC Uniform System of Accounts
Beijing, January 16, 2014

2012 **Agencia Nacional de Petroleo, Gas Natural e Combustiveis (Brazil)**
Natural Gas Pipeline Regulation in the United States (training course)
Rio de Janiero, September 18-19, 2012

2012 **Center for Research in Regulated Industries Eastern Conference**
Optimal Capital Structures for Regulated Public Utilities: When Does an Imputed Debt Ratio Make Sense for Ratemaking Purposes?
Eastern Conference, Delaware May 18, 2012

2012 **Energy Policy Briefing Note**
The Real Costs of Eliminating Unsecured Credit Lines and Requiring Cash Collateral in OTC Swaps Markets
Co-author: Sharon Brown-Hruska, March 13, 2012

2012 **Law Seminars International, Electric Utility Rate Case Conference**
Marginal Cost Pricing for Rate Design
Las Vagas, February 2, 2012.

2012 **Center for Research in Regulated Industries**
Advanced Workshop in Regulation and Competition
Gas Pipeline Overearning Investigations
Newark, New Jersey, January 13, 2012.

2011 **Working Group of Commercial Energy Firms**
Cost-Benefit Analysis of the CFTC's Proposed Swap Dealer Definition
December 20, 2011.

2011 **Law Seminars International, Renewable Energy in the Pacific Northwest**
Abundant Low-Cost Natural Gas? A Driver of Market Activity
August 4, 2011.

2011 **Public Utilities Fortnightly**
Zone of Reasonableness: Coping with Rising Profitability a Decade after Restructuring
July 2011.

2011	**Law Seminars International, Electric Utility Rate Case Conference** Rate Design Issues Among Customer Classes Las Vegas, February 10, 2011.
2011	**Advanced Workshop in Regulation and Competition, Center for Research in Regulated Industries** Decoupling and the Cost of Equity Newark, New Jersey, January 14, 2011.
2010	**New York State Bar Association, Business Law Section Committee on Public Utility Law** Getting Renewables to Market: The Importance of Transmission Ratemaking Policy New York, July 24, 2010.
2009	**Law Seminars International Conference, Renewable Energy in New England** Getting Renewable Power to Market Boston, June 25, 2009.
2008	**Report for Baltimore Gas & Electric and Allegheny Power** Evaluation of Longer-Term Procurement Plans October 1, 2008.
2008	**Electricity Journal** The Continuing Rationale for Full and Timely Recovery of Fuel Price Levels in Fuel Adjustment Clauses July 2008.
2008	**Energy in the Southwest Conference** Natural Gas as a Fuel: Will There Be Enough? At What Prices? July 22, 2008.
2007	**NERA Economic Consulting** The Line in the Sand: The Shifting Boundary Between Markets and Regulation in Network Industries. Coauthor.
2007	**Electric Utility and Natural Gas Interdependency** Managing Risk in Interdependent Gas and Power Markets Houston, March 6, 2007.

2004	**Electricity Journal** FERC Imposes New Constraints on Utility Procurement October 2004.
2003	**Northeast Gas Storage and Supply Strategies** Can Your Capital Structure Handle Today's Market, Credit and Liquidity Risks? Boston, June 17, 2003.
1996	**World Bank** Regulatory and institutional reforms in the Chinese power sector Contributor, 1996.
1993	**World Development** Political Economy, Convergence and Growth in Less Developed Countries Coauthor, 1996.

April 2017

Duke Energy Carolinas
Response to
Tech Customers
Data Request No. Tech Customers 2-6

Docket No. E-7, Sub 1146

Date of Request: **November 27, 2017**
Date of Response: **December 7, 2017**

☐ **CONFIDENTIAL**

☒ **NOT CONFIDENTIAL**

Confidential Responses are provided pursuant to Confidentiality Agreement

The attached response to Tech Customers Data Request No. 2-6, was provided to me by the following individual(s): Christine Perciaccante, CW-Professional, Rate Case Planning & Execution-DE, and was provided to Tech Customers under my supervision.

Heather Smith
Deputy General Counsel
Duke Energy Carolinas

Tech Customers
Data Request No. 2
DEC Docket No. E-7, Sub 1146
Item No. 2-6
Page 1 of 2

Tech Customers 2-6

Request:

With reference to the following statement on page 34, lines 13-15: "The inability to collect amounts from customers in the same timeframe that the Company makes large grid investments will dilute cash flows and earnings"

(a) If dilution of cash flow and earnings is a concern for the $2.9 billion Power/Forward Carolina investments, please explain why it is not a concern for the $4.5 billion in traditional T&D investments (Simpson, page 23, lines 10-11) not to be covered by the GRR Rider. Please explain why traditional T&D investments do not raise the same concerns

(b) Please quantify the effects referenced in this section of the testimony as follows:

(i) Please provide forecasts of DEC's cash flow and earnings for the next five years assuming that the NCUC does not approve the GRR Rider and also assuming that DEC undertakes the Power/Forward Carolina investments it considers necessary to provide safe, reliable electric service with cost recovery occurring through traditional ratemaking process.

(ii) Please provide forecasts of DEC's cash flow and earnings for the next five years assuming that the NCUC does approve the GRR Rider and DEC proceeds as planned with its Power/Forward Carolina investments with cost recovery through the GRR Rider.

(iii) Please quantify the dilution by comparing the prior two analyses.

(iv) Please provide forecasts of DEC's cash flow and earnings for the next five years assuming that the NCUC approves the GRR Rider but also orders DEC to include its planned $4.5 billion in traditional T&D capital investments in the GRR Rider together with the $2.9 billion in Power/Forward Carolina investments.

Tech Customers
Data Request No. 2
DEC Docket No. E-7, Sub 1146
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Page 2 of 2

Response:

(a) The test year is representative of a traditional level of spending and the Company's existing revenues would likely cover normal spending. However, if there is a significant increase in operating costs and/or rate base, existing revenues are likely to be insufficient and the Company would need to consider a rider or a rate case to address the dilution of cash flow and earnings.

(b)

(i)The Company has not performed this particular analysis of the cash flow and earnings with the assumptions that are being requested.

(ii)The Company has not performed this particular analysis of the cash flow and earnings with the assumptions that are being requested.

(iii)The Company has not performed this particular analysis with the assumptions that are being requested.

(iv)The Company has not performed this particular analysis of the cash flow and earnings with the assumptions that are being requested.

Duke Energy Carolinas
Response to
Tech Customers
Data Request No. Tech Customers 2-30

Docket No. E-7, Sub 1146

Date of Request: **December 14, 2017**
Date of Response: **December 27, 2017**

☐ **CONFIDENTIAL**

☒ **NOT CONFIDENTIAL**

Confidential Responses are provided pursuant to Confidentiality Agreement

The attached response to Tech Customers Data Request No. 2-30, was provided to me by the following individual(s): Katie Aittola, Director Regional Finance Forecasting, Finance Forecasting & Analysis, and was provided to Tech Customers under my supervision.

Heather Smith
Deputy General Counsel
Duke Energy Carolinas

Tech Customers
Data Request No. 2
DEC Docket No. E-7, Sub 1146
Item No. 2-30
Page 1 of 1

Tech Customers 2-30

Request:

DEC's response to Tech Customers 2-6 states, "The Company has not performed this particular analysis of the cash flow and earnings with the assumptions that are being requested." ***Please list the analyses of cash flows and earnings that DEC has performed in connection with its preparation for this rate case. Do any of those analyses support the statement made on page 34, lines 13-15? If so, please identify them and provide copies.***

Response:

The forecasted cash flows are prepared at an aggregate level at the total utility level. The forecasted cash flows are not itemized at a detailed level for each initiative and therefore do not specifically address the statement on page 34, lines 13-15.

Examples of Elements of Other Capital Trackers

Clear Definition of Eligible Assets:

- Georgia Public Service Commission, "Atlanta Gas Light Company's Integrated Vintage Plastic Replacement (i-VPR) Program Under Georgia STRIDE," Amended Stipulation, Docket No. 29950.
    - "The Program shall consist of the replacement of no more than 756 miles of vintage plastic pipe, primarily consisting of pre-1974 vintage Aldyl-A pipe, together with related services and appurtenances. The Company estimates the 756 miles will consist of 523 miles of pre-1974 vintage plastic pipe; 159 miles of 1974-1983 vintage pipe with the highest leak rates; and 74 miles of other connected plastic pipe in adjoining work zones."

- Georgia Public Service Commission, "Atlanta Gas Light Company's Integrated System Reinforcement Program (i-SRP) Under Georgia STRIDE: 2013-2017 i-SRP 2.0 Plan," Stipulation, Docket No. 37370.
    - "This Stipulation is limited to the approval of the following projects to address system reliability issues in certain areas in Coweta, Fayette Gwinnet, Hall, Forsyth, and Dawson counties. The 2013-2017 i-SRP provides for the following projects:
        - Southwest Metro Project (Coweta and Fayette counties);
        - Northeast Metro Project (Gwinnett and Hall counties; and
        - North Metro Project (Forsyth and Dawson counties)."
    - "The Southwest Metro Project is referenced as the Newnan Bypass project, which calls for the installation of 17.4 miles of sixteen inch steel transmission pipeline with a planned Maximum Allowable Operating Pressure of 1,200 psig."
    - "The Northeast Metro Project is designed in two segments that include the Duluth Highway project, which calls for the installation of seven miles of twelve inch and 1.8 miles of six inch steel pipeline with a planned MAOP of 300 psig and the Suwannee Tap to Friendship Road project, which requires for the installation of 12.2 miles of twelve inch transmission pipeline with a planned MAOP of 720 psig."
    - "The North Metro Project is referenced as the Cumming Lateral project, which calls for the installation of 10.8 miles of sixteen inch steel transmission pipeline with a planned MAOP of 720 psig."

- Public Service Commission of Maryland, "In the Matter of the Application of the Baltimore Gas and Electric Company for Approval of a Gas System Strategic

Infrastructure Development and Enhancement Plan and Accompanying Cost Recovery Mechanism," Order No. 86147, Case No. 9331.

- "Beginning in 2014 BGE plans to replace in their entirety five gas asset classes over thirty years, in order to remove aging infrastructure and improve safe and reliable gas service. Those asset classes include:
  - All pre-1982 plastic "Ski-Bar" service risers on BGE's system (an estimated 13,196 plastic risers);
  - All Bare Steel Main on BGE's system (roughly 42 miles of pipeline);
  - All Cast Iron Main on BGE's system (roughly 1,292 miles of pipeline);
  - All Bare Steel Services on BGE's system (an estimated 79,138 services or approximately 929 miles of service pipe); and
  - All Copper Services on BGE's system (an estimated 23,595 services or approximately 277 miles of service pipe)."
- "BGE has agreed to file annually, as part of its annual gas distribution system report filing, a list of STRIDE projects completed in the past year and a listing of STRIDE projects for the upcoming year."

- State of New Jersey, Board of Public Utilities, "In the Matter of the Petition of Public Service Electric and Gas Company for Approval of the Energy Strong Program," Stipulation, Docket Nos. EO13020155 and GO13020156.
  - "Electric Station Flood Mitigation. This subprogram will implement flood mitigation for 29 substations that had water intrusion in Superstorm Sandy, Hurricane Irene, or other recent water intrusion events." (see page 10 for list of switching/substations)
  - "Electric Distribution Contingency Reconfiguration Strategies. PSE&G will increase the sections in its present loop designs, creating multiple sections, utilizing smart switches, smart fuses, and adding redundancy within its loop scheme….The work will include the deployment of additional feeder reclosers to traditional 13-kV loops."
  - "Advanced Technologies. The Advanced Technologies subprogram will equip certain stations with Microprocessor Replays and expanded SCADA…"
  - "Utilization Pressure Cast Iron (UPCI). PSE&G will replace an estimated 250 miles of utilization pressure cast iron main and associated services over a three year period with a higher operating pressure system utilizing plastic or cathodically protected steel mains and services in areas that were previously flooded or are in FEMA flood zones or proximity thereto."
  - "Metering & Regulating Station Flood Mitigation. This subprogram will implement flood mitigation for the stations listed above that had water intrusion in Superstorm Sandy as well as provide an auxiliary generator at the Burlington Liquefied Natural Gas Plant station." (see page 12 for list of stations)

- State of New Jersey, Board of Public Utilities, "In the Matter of the Petition of Rockland Electric Company for Establishment of a Storm Hardening Surcharge," Stipulation, Docket No. ER14030250.
    - "Selective Undergrounding. The Selective Undergrounding sub-program consists of a single project located in West Milford, New Jersey. The project will provide for the installation of a new circuit consisting of approximately 8,500 feet of underground construction from the West Milford substation along Marshall Hill Road to Ridge Road (just south of Union Valley Road). Circuit 79-5-13, which exits the West Milford substation and runs approximately 5,000 feet as an overhead double circuit heading west along Marshall Hill Road, will be relocated underground from the substation to the intersection of Macopin Road and Union Valley Road."
    - "Overhead System Construction. Under the Overhead System Construction subprogram, the Company will undertake the following five enhanced overhead system construction projects:" (see page 7 for list of projects)
    - "Substation Flood Mitigation. The Company will purchase a Muscle Wall Flood and Containment Solution ("Muscle Wall") that it will store and pre-position as needed to divert flood water out of the Cresskill and Upper Saddle River substations."
    - "Distribution Automation/Smart Grid Expansion…. Specifically, the Company will invest up to $8 million over three years for the following types of equipment and circuit enhancements:" (see page 9 for list of enhancements)

- State of New Jersey, Board of Public Utilities, "In the Matter of the Petition of South Jersey Gas Company for Approval of a Storm Hardening and Reliability Program (SHARP) and Associated Recovery Mechanism," Decision and Order Approving Stipulation, Docket No. GO13090814
    - "Through the SHARP Petition, the Company proposed to replace 179 miles of distribution main and approximately 26,000 services operating at low pressure in Atlantic City, Ventnor, Margate, Longport, Pleasantville, Somers Point, Ocean City, Wildwood, North Wildwood, Wildwood Crest and West Cape May, with high pressure main and services (the "Coastal Areas"). The Company also proposed to eliminate 52 regulator stations that would no longer be necessary following the upgrade of these mains and services to high pressure and to install Excess Flow Valves…"

Ceiling (or other limitation) on the investments:

- State of New Jersey, Board of Public Utilities, "In the Matter of Public Service Electric and Gas Company for Approval of a Gas System Modernization Program and Associated

Cost Recovery Mechanism," Decision and Order Approving Stipulation, Docket No. GR15030272.

- Company Proposal: "The Company also sought approval to spend up to $1.594 billion in Gas System Modernization Program (GSMP) investment across its gas service territory over five and one-half (5.5) years."
- Commission Order: "The cost of the Program shall be limited to $650 million, which excludes the costs associated with the Stipulated Base and Allowance for Funds Used During Construction. Recovery of costs beyond $650 million may be sought through a base rate case." (over 3 years)

- State of New Jersey, Board of Public Utilities, "In the Matter of the Petition of Public Service Electric and Gas Company for Approval of the Energy Strong Program," Order Approving Stipulation of Settlement, Docket Nos. EO13020155 and GO13020156.
  - Company Proposal: "PSE&G requested approval of approximately $2.6 billion in infrastructure upgrades over a period of five years with the cots to be collected from ratepayers through the implementation of an 'Energy Strong Adjustment Mechanism."
  - Commission Order: "PSE&G will invest up to $1 billion, $600 million for the Electric Investment Program and $400 million for the Gas Investment Program, recovered through the cost recovery mechanism described in the stipulation. PSE&G will invest an additional $220 million into the electric investment program, related to substation investment, the recovery of which will not be included in the Energy Strong rate recovery mechanism but which it will seek to recover in its next base rate case." (over 3 years)

- State of New Jersey, Board of Public Utilities, "In the Matter of the Petition of South Jersey Gas Company for Approval of a Storm Hardening and Reliability Program (SHARP) and Associated Recovery Mechanism," Decision and Order Approving Stipulation, Docket No. GO13090814.
  - Company Proposal: "South Jersey Gas Company filed a petition…for approval of its Storm Hardening and Reliability Program ('SHARP') including approval to: (1) invest approximately $280 million in the Company's natural gas infrastructure and related facilities over a seven (7) year period; and (2) utilize an associated recovery mechanism for the costs to be collected from ratepayers through an annual SHARP rate adjustment."
  - Commission Order: "SHARP investment level will be capped at $103.5 million, excluding Allowance for Funds Used During Construction ('AFUDC'), to be recovered through the stipulated cost recovery mechanism….The SHARP project costs shall not exceed $34.5 million per year, plus or minus 15%, with a total cap of $103.5 million over a three (3) year period."

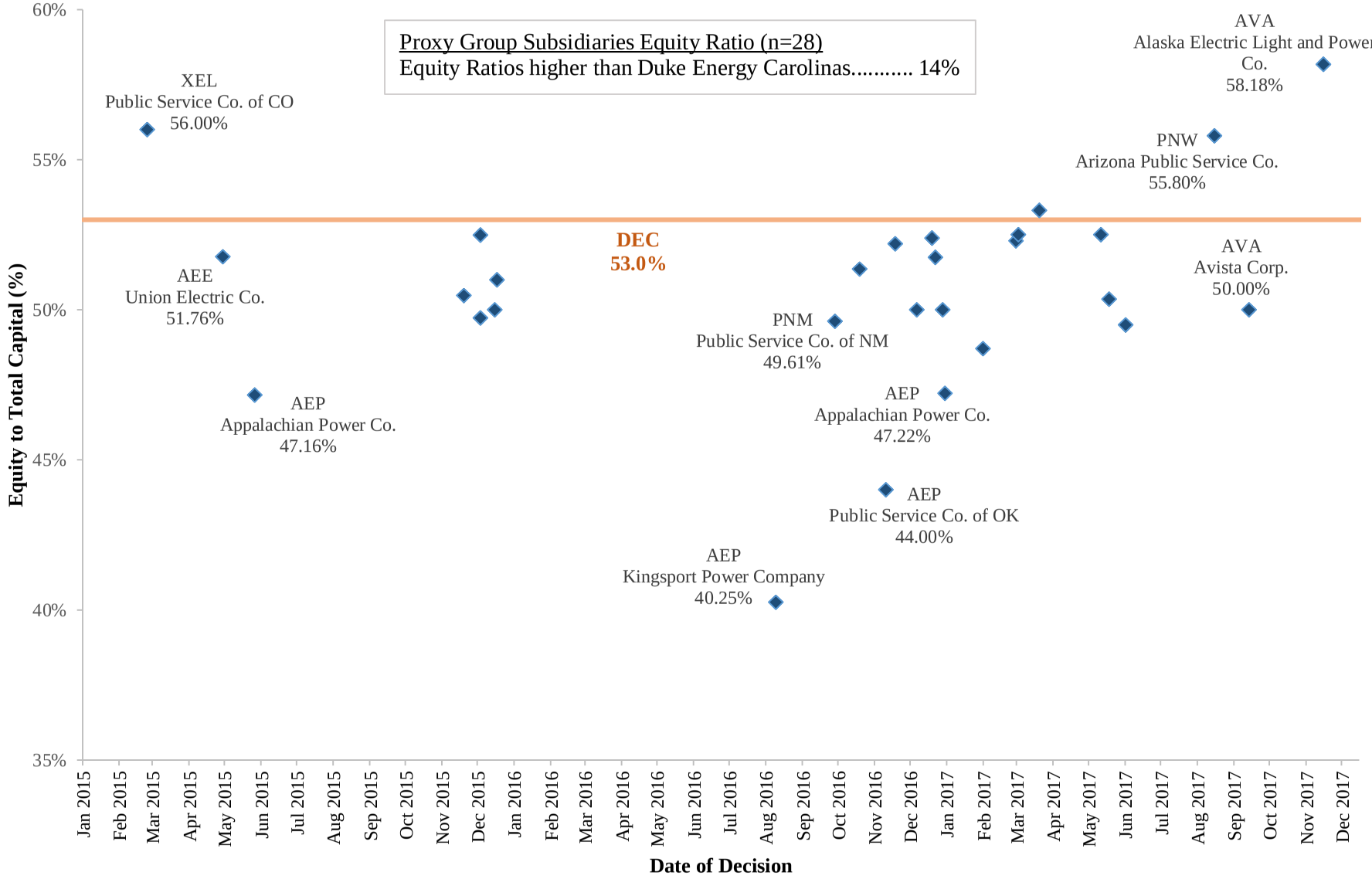
- State of Maine, Public Utilities Commission, "Northern Utilities, Inc. d/b/a Unitil, Proposed Increase in Rates," Stipulation, Docket No. 2013-00133.
    - "The TIRA Rate Impact Cap shall be set at 4% of the Company's distribution revenues. Amounts in excess of the TIRA rate impact cap shall be deferred and shall accrue carrying costs at the prime rate. The prime rate shall be fixed on a quarterly basis and established as reported in the Wall Street Journal on the first business day of the month preceding the calendar quarter. If more than one prime rate is reported, the average of the reported prime rates shall be utilized."

- Before the North Carolina Utilities Commission, "In the Matter of Application of Public Service Company of North Carolina, Inc. for a General Increase in its Rates and Charges," Amended Stipulation, Exhibit H, Docket No. G-5, Sub 565.
    - "costs incurred for system expansion/improvement or routine maintenance, repair and replacement of system components that are not primarily required to comply with federal gas pipeline safety requirements shall not be recovered through the IMT but through inclusion in rate base in PSNC's next general rate case."

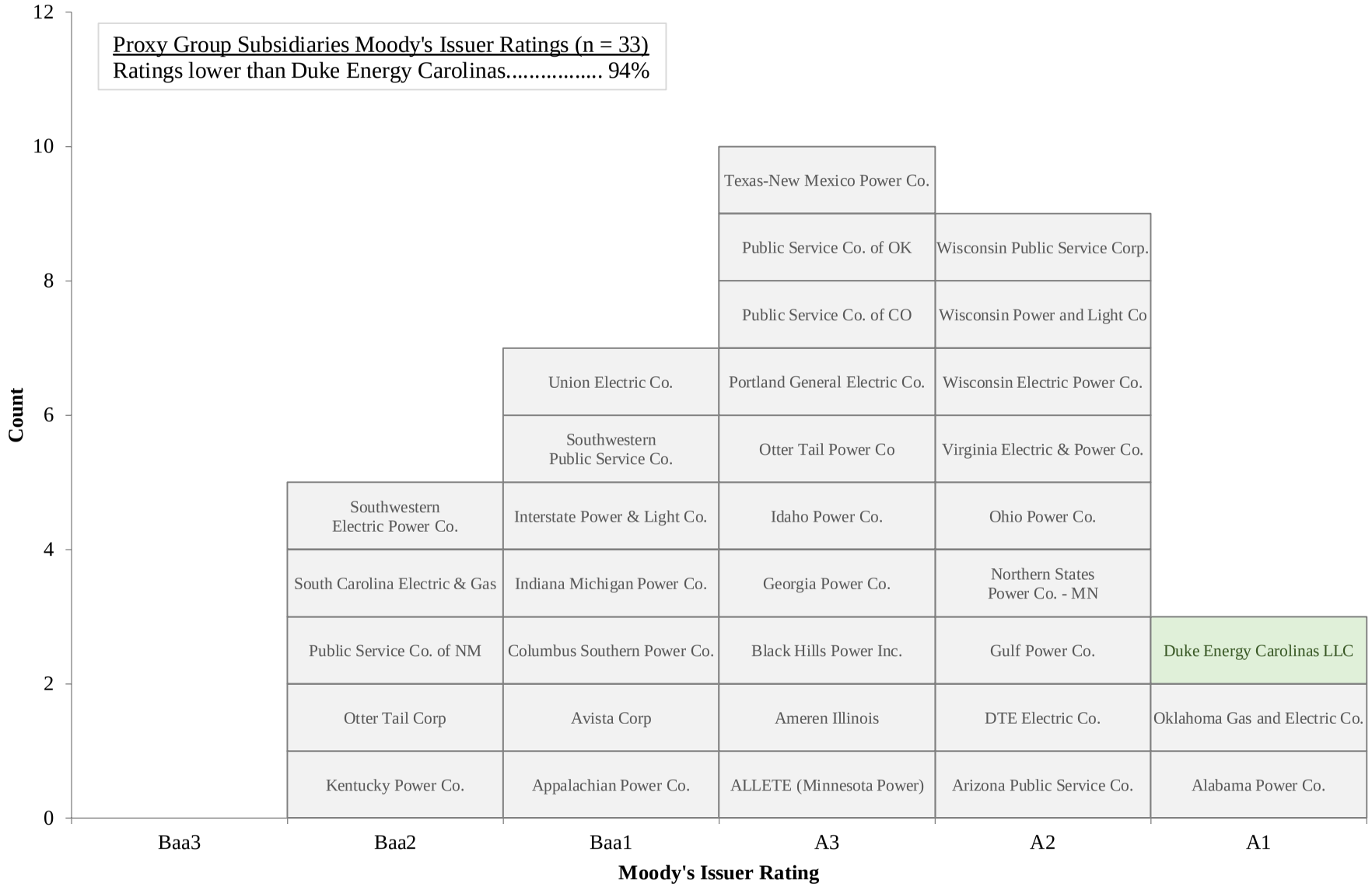
<u>O&M Offset:</u>

- State of Maine, Public Utilities Commission, "Northern Utilities, Inc. d/b/a Unitil, Proposed Increase in Rates," Exhibit 2, Docket No. 2013-00133.
    - "The annual TIRA…will be calculated as a percentage change to current base rates and will be based upon the TIRA Revenue Requirement as a percentage of the previous year's weather-normalized Distribution Revenue. The TIRA Revenue Requirement will be the sum of the annual Depreciation Expense, estimated property tax expense based on the Property Tax Rate, Operation and Maintenance Expense Offset and allowed return for the Eligible Facilities. The allowed return shall be calculated by multiplying the sum of the properly capitalizable costs less the related Accumulated Reserve for Depreciation and Accumulated Deferred Income Taxes by a pre-tax rate of return of 11.00%."
    - '"Operating and Maintenance Expense Offset" is an amount of $5,544 per mile of cast iron, bare steel and non-cathodically protected (unprotected) coated steel mains taken out of service in a Calendar Year preceding the TIRA annual recovery period that begins each May 1.'

Duke Energy Has an Equity Ratio that is Among the Highest in the Proxy Group Indicating Relatively Low Financial Risk

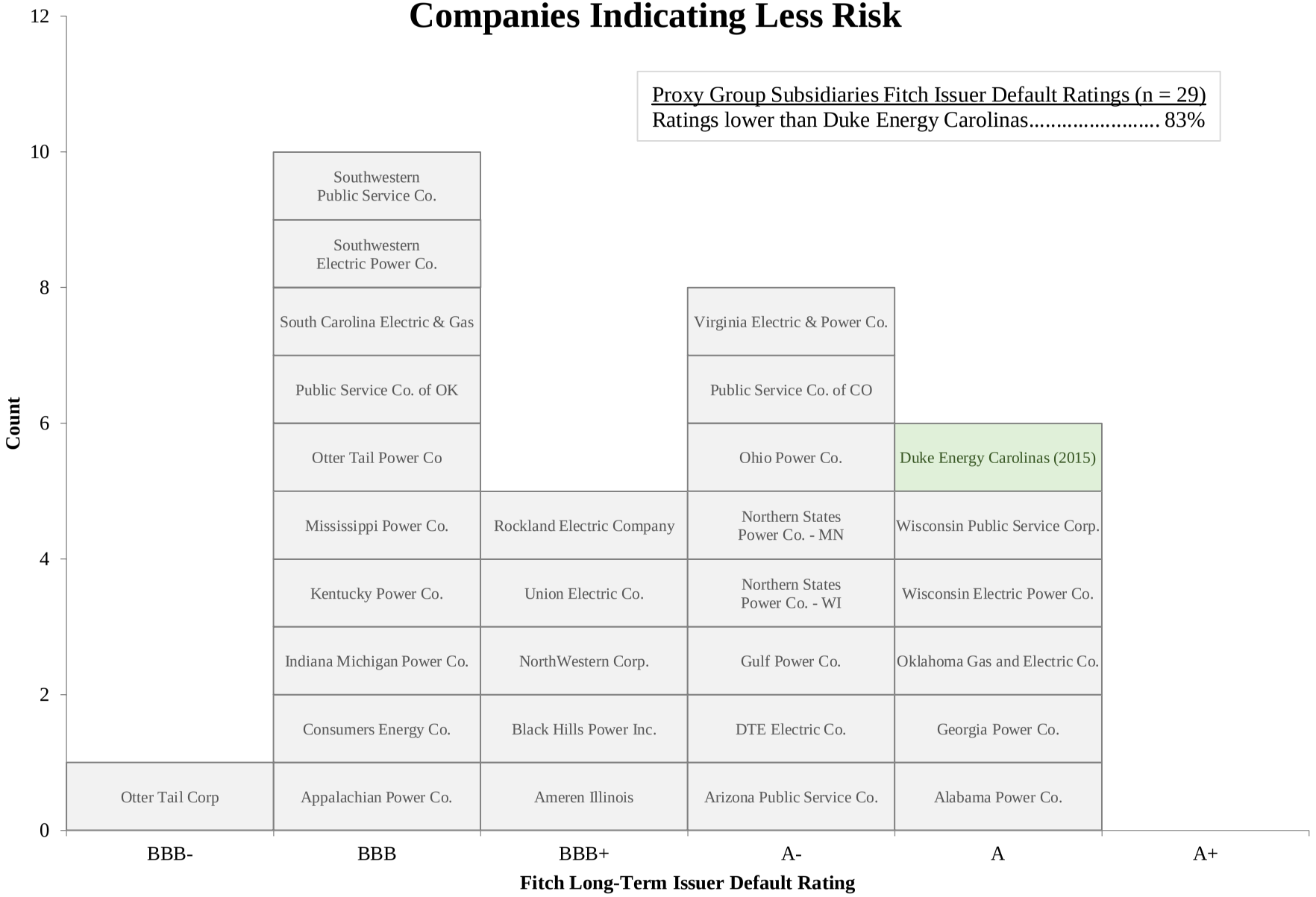


Duke Energy has a Higher Bond Rating than Most Proxy Group Companies Indicating Less Risk



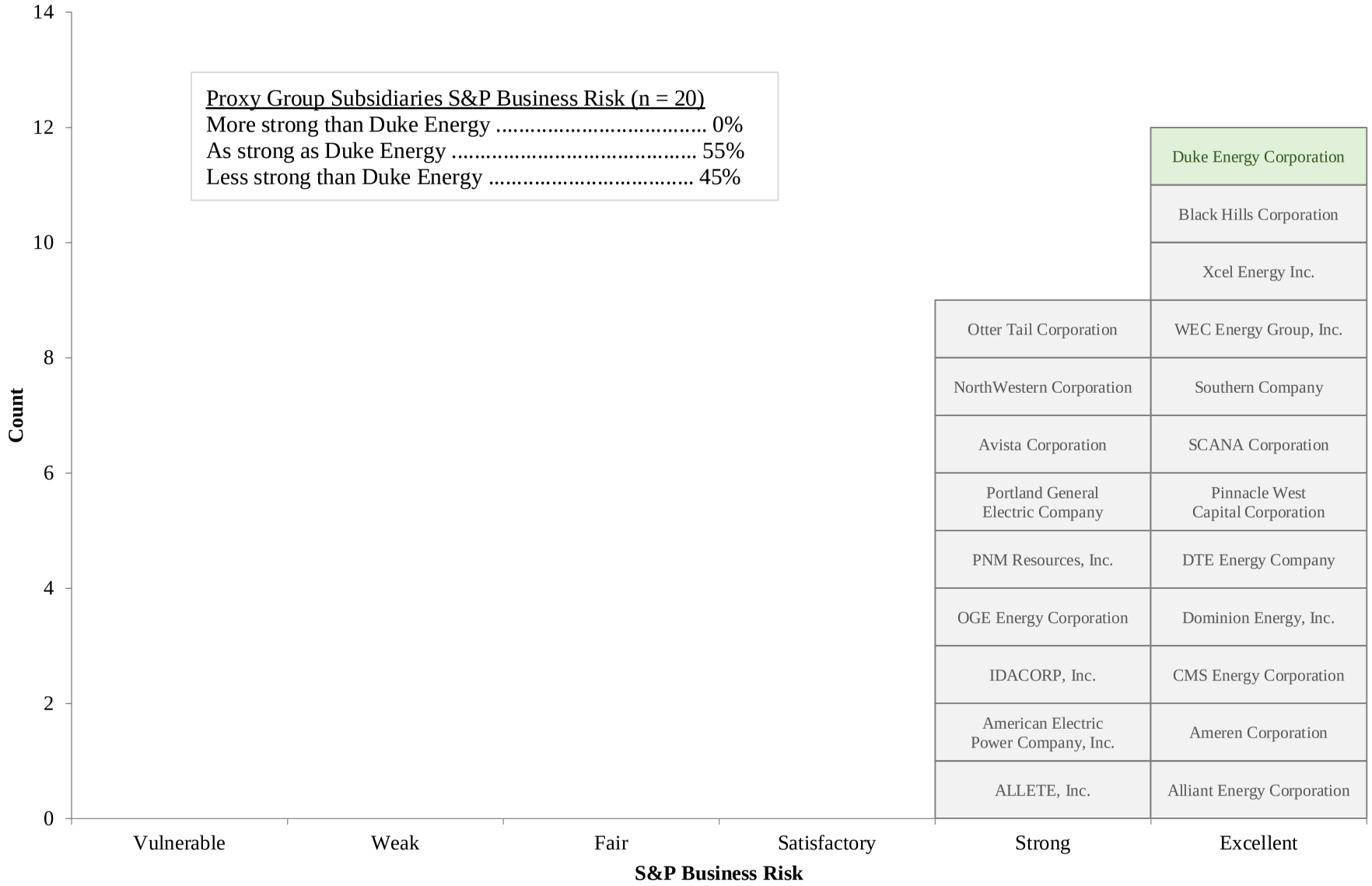
Source: Bloomberg, L.P.

Duke Energy has a Higher Bond Rating than Most Proxy Group Companies Indicating Less Risk



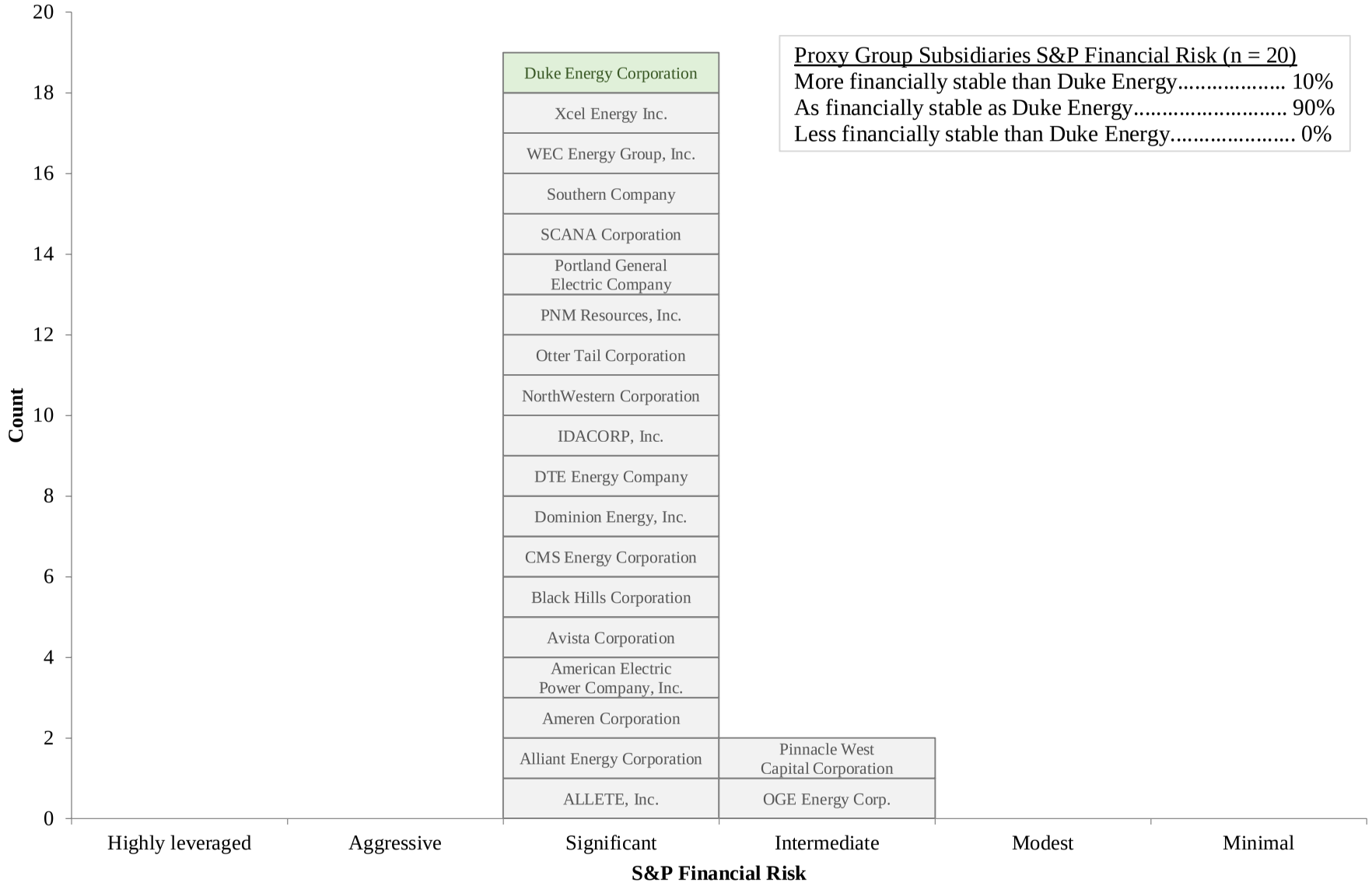
Source: Bloomberg, L.P.

Duke Energy has the Least Risky Business Risk Ranking from Standard & Poor's



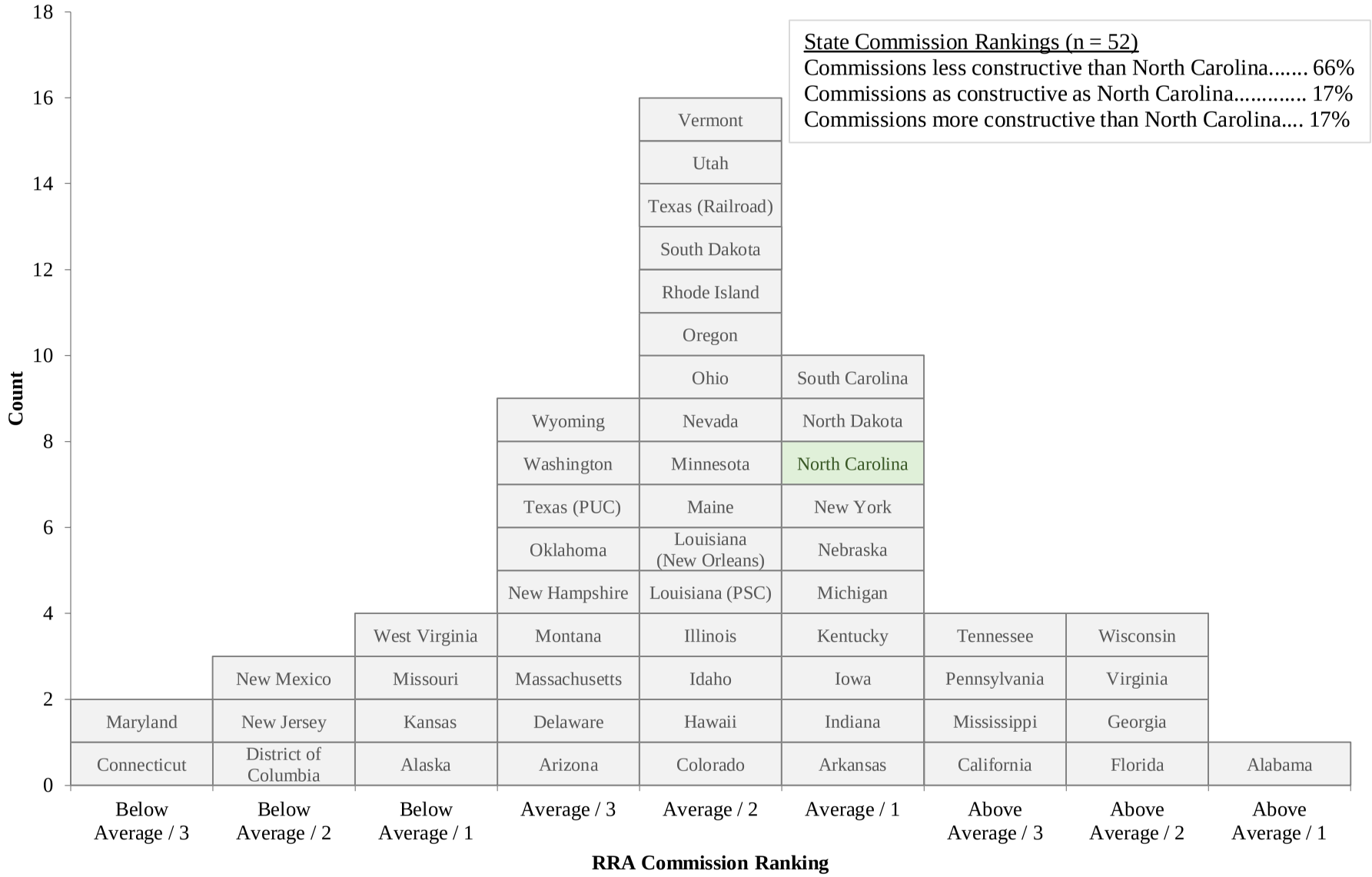
Source: Standard & Poor's Financial Services LLC

Duke Energy Carolinas' Parent has Similar Financial Risk to the Parent Proxy Group Companies



Source: Standard & Poor's Financial Services LLC

North Carolina Regulatory Risk Ranking is Favorable Relative to Other States



Source: SNL Financial