Determining the Required Return on Equity (ROE) Value for Regulated Electric Utilities: Challenges and Opportunities for Designing Regulatory Decision Support Tools

by

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Abstract

Public utility commissions (PUCs) across the country face challenging decisions as regulated electric utilities adapt to the opportunities and risks within the new energy landscape. The natural gas boom, the need for replacement of aging infrastructure, and the threat of potential environmental regulations have brought the energy future of the United States to a crossroads. Consequently, PUCs have seen an increase in the number of rate cases filed by electric utilities to recover capital and operating costs of new and existing electric generation infrastructure.

In general, rates are approved or adjusted based on a "cost-plus method," which is comprised of a utility's operating costs and capital investments plus a risk-adjusted profit margin, also referred to as the return on equity (ROE). Determining the required ROE for an electric utility is the most contentious and difficult component of a rate case due to its highly subjective and variable inputs. PUCs are responsible to approve an ROE that corresponds to a utility's level of risk, so that it can attract the capital needed to ensure safe and reliable service at reasonable costs for consumers. As utilities and consumer advocates present arguments for different ROE values, PUC decision making becomes extremely challenging. This study analyzes the major challenges in estimating ROEs through a case study of the Duke Energy Carolinas rate cases from February 2013 and July 2011. This analysis identifies the objective and subjective components of a required ROE determination and highlights the need for setting standards and developing decision support tools to enhance the transparency and efficiency of PUCs decision making process regarding this contentious issue.

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1. Introduction

The United States is transitioning to a low carbon future that demands novel approaches and strategies from utilities and regulators. The new energy landscape is rooted in three significant developments: the domestic natural gas revolution, aging fleet of electric power generators, and increased federal environmental regulations.

I. Natural gas boom

Increases in proven reserves and advances in drilling technology drove down the price of natural gas from $8.86 per million British thermal units (MMBtu) in 2008 to $2.75 per MMBtu in 2012 (EIA 2013). Declining natural gas prices have made natural gas-fired generators competitive with coal-fired power plants, impacting the generation mix of utilities (Pratson, Haerer and Patiño-Echeverri 2013). Electricity generation from natural gas accounted for "16 percent of total generation in 2000, rose to 24 percent in 2010 and is expected to continue increasing" (EIA 2012). The natural gas boom will affect electric utilities' integrated resource plans (IRPs) as they attempt to forecast fuel prices decades into the future.

II. Aging infrastructure

Over half of the electric power generators in the United States are over 30 years old. Most coal-fired plants were built before 1980, while the majority of nuclear plants were built between 1960 and 1990 (EIA 2011). There are many issues tied to aging infrastructure, including greater failure rates, decreased efficiency, and high repair costs. As the nation's power fleet ages, utilities have to decide whether to retire or retrofit plants, or build new generation. This situation is especially applicable to older coal plants, which require costly retrofits to limit the release of air pollutants.

III. Potential environmental regulations

The U.S. Environmental Protection Agency (EPA) is continuously increasing regulations to comply with the Clean Air Act that have significant cost implications on power plants. In March 2013, the EPA updated the Mercury and Air Toxics Standards (MATS) for New Power Plants. Another important regulation is the upcoming New Source Performance Standards (NSPS) for greenhouse gas emissions, which would effectively halt construction of new coal-fired power plants without carbon capture and sequestration (CCS) technology. Current and future water, air, and waste regulations directly impact utilities' bottom lines.

Combined, these three recent developments have created new opportunities and risks for utility companies. In response, some utilities have begun to invest in new generation and make changes to their infrastructure. However, electric regulation is not uniform across the U.S., as 15 states have electricity deregulation with retail choice, 28 states have inactive restructuring with no retail choice, and seven states have suspended deregulation (EIA 2010). This paper focuses on regulated electric utilities, which are granted monopoly rights over a service territory in exchange for rate of return regulation. Regulated utilities are required submit integrated resource plans (IRPs) and file rate cases with public utility commissions (PUCs). IRPs are 10 to 20 year plans that forecast demand and identify resources to meet that demand. Rate cases are requests to adjust electricity rates in order to recover investments in new and current infrastructure, environmental compliance costs, and operations and maintenance costs.

The new energy landscape has led to many changes in the electric generation mix across the U.S., mostly towards low carbon generation and retirement of aging infrastructure. This is reflected in the increase in rate cases over the past decade. PUCs generally approve or adjust rates on a "cost-plus method": a utility's costs and capital investments plus a risk-adjusted profit margin, also referred to as the return on equity, or ROE (Regulatory Research Associates 2009). PUCs are responsible to approve a ROE that corresponds to a utility's level of risk to enable access to capital and ensure safe and reliable service at reasonable costs for consumers. Utilities determine the required ROE through two widely used types of analyses, the Comparable Earnings Approach and Market Analysis, combined with a relative risk evaluation for their company. The outputs of these models vary greatly and are influenced by subjective inputs.

To our knowledge, PUCs currently lack support tools to determine acceptable values of such subjective inputs and appropriate risk determination factors to determine fair ROE values. In an effort to fill this gap, this report breaks down and analyzes the components of the Comparable Earnings Approach, Market Analysis, and risk determination. It also delves into the major challenges in estimating the ROE through a case study of the Duke Energy Carolinas rate cases from February 2013 and July 2011, with the goal of exploring possible frameworks for the creation of a decision support tool to inform analysis by PUCs and other stakeholders.

2. Duke Energy Background

Duke Energy is the nation's largest electric power company, serving over seven million customers throughout the Southeast and Midwest (Duke Energy 2013). It has over 58,000 megawatts (MW) of generating capacity from a mix of coal, nuclear, natural gas, hydroelectric, and renewable energy resources (Duke Energy 2013). Duke Energy is headquartered in Charlotte, North Carolina, and was established in 1904. It has since grown to a Fortune 250 company with over $100 billion in assets (Duke Energy n.d.). In July 2012, Progress Energy merged with Duke Energy and became a wholly owned direct subsidiary of Duke Energy (Duke Energy 2012).

Duke Energy operates through its direct and indirectly wholly owned subsidiaries: Duke Energy Carolinas, LLC, Progress Energy Carolinas, Duke Energy Indiana, Inc., Duke Energy Ohio, Inc., Duke Energy Kentucky, Inc., Progress Energy Florida, and Duke Energy Renewables (Duke Energy 2013).

2.1. Duke Energy Carolinas

Duke Energy Carolinas (DEC) serves the electricity needs of approximately 2.4 million customers in North and South Carolina, covering an area of 24,000 square miles. About 1.9 million of the customers are in North Carolina (Duke Energy 2013). DEC has a total generating capacity of over 19,000 MW from nuclear, fossil fuels, hydroelectric, and renewables. The generation type and percentage is disaggregated in Table 1 (Duke Energy 2013).

Table 1. Duke Energy Carolinas Generation Mix

Duke Energy Carolinas Generation Mix (MW)		
Nuclear	5,173	26.9%
Fossil Fuels	10,797	56.2%
Hydroelectric	3,230	16.8%
Renewables	8	0.04%
Total	19,208	100.0%

The Duke Energy North Carolina electric rate, effective since February 1, 2013, for residential customers is 9.3 cents per kilowatt-hour (kWh) plus a monthly basic facilities charge of $9.90 (Duke Energy Carolinas 2012).

3. NCUC Background

Public utility commissions (PUCs) are state-level governing bodies that regulate public and/or private utilities to ensure safe and reliable services at reasonable rates for consumers. The North Carolina Utilities Commission (NCUC) regulates “electric, telephone, natural gas, water, wastewater, water resale, household goods transportation, busses, brokers, and ferryboats” (North Carolina Utilities Commission n.d.). North Carolina is a traditionally regulated state where electric utilities are granted monopoly over service areas under regulation by the NCUC, which approves rates and capital investments. The NCUC mission statement lays out its responsibilities to the using and consuming public and utilities as such:

> "Provide fair regulation of public utilities in the interest of the public.
>
> Promote the inherent advantage of regulated public utilities.
>
> Promote adequate, reliable, and economical utility service.
>
> Promote least cost energy planning.
>
> Provide just and reasonable rates and charges for public utility services and promote conservation of energy.
>
> Assure that facilities necessary to meet future growth can be financed on reasonable and fair terms.
>
> Encourage and promote harmony between utility companies and their customers.
>
> Foster planned growth of public utility services.
>
> Coordinate energy supply facilities with the state's development.
>
> Cooperate with other states and the federal government in providing interstate and intrastate public utility service and reliability of energy supply.
>
> Facilitate the construction of facilities in and the extension of natural gas service to unserved areas" (North Carolina Utilities Commission n.d.).

3.1. NCUC Structure

The NCUC is an administrative board of the North Carolina General Assembly. The responsibilities are delineated in the Public Utilities Act, or Chapter 62 of the North Carolina General Statutes. It is headed by seven commissioners, appointed by the Governor and confirmed by the General Assembly. The Governor selects one commissioner as the Chairman to act as the chief executive and administrative officer of the NCUC. Each commissioner serves an eight-year term, while the Chairman serves a four-year term. The current NCUC commissioners are Chairman Edward S. Finley, Jr., William Thomas Culpepper, III, Bryan Beatty, Susan Rabon, ToNola D. Brown-Bland, and Lucy T. Allen (North Carolina Utilities Commission n.d.).

There are three divisions within the Commission: Legal, Operations, and Fiscal Management and Administration. The Legal Division is responsible for providing legal counsel, assistance, and support to the Commission, as well as assembling the annual final report of major Commission Orders and Decisions. The Operations Division provides counsel, assistance, and support to the Commission on the accounting, finance, economics, engineering, statistics, and operations analysis of investor-owned public utilities. The Fiscal Management and Administrative Division manages the Commission's budget and its official files, and assembles the annual Analytical and Statistical Report.

The Public Staff of the Commission is an independent agency that represents the using and consuming public "to review, investigate, and make appropriate recommendations to the NCUC with respect to the reasonableness of rates charged and adequacy of service provided by any public utility and with respect to the consistency with the public policy of assuring an energy supply adequate to protect the public health and safety. The Public Staff intervenes on behalf of the using and consuming public in all Commission proceedings affecting rates or service" (Public Staff of the NCUC 2010).

4. Rate Case Background

Under the U.S. Supreme Court's decisions on *Hope* and *Bluefield* in 1944 and 1923, respectively, public utilities are entitled to earn a return on capital investments, consistent with the allowed return for businesses with similar risk levels (Hope 1944) (Bluefield 1923). The return must be adequate to provide access to capital and support credit quality, and must result in just and reasonable rates for consumers.

For traditionally regulated utilities, such as Duke Energy Carolinas, a rate case must be filed with the public utility commission in order to raise prices and recover capital investments. Utility commissions approve or adjust rates based on a "cost-plus method" comprised of a utility's costs and capital investments plus a risk-adjusted profit margin, also referred to as the return on equity (ROE) (Regulatory Research Associates 2009).

4.1. Rate Case Trends

In 2012, according to the Edison Electric Institute (EEI), shareholder-owned utilities filed 53 rate cases, mainly to recoup capital expenditure spending, but also to recover operations and maintenance costs, as well as implement surcharges, trackers, and riders (Edison Electric Institute 2012). This is consistent with the recent trend of increased filing of rate cases, due in part to the weak economy. In 2012, the average approved ROE was 10.15 percent, while the average requested ROE was 10.65 percent, both of which are historically low (Edison Electric Institute 2012). Furthermore, the average regulatory lag, or the time between a rate case is filed and decided upon, has been around 10 months (Edison Electric Institute 2012). This may be contributing to the requested level of return and frequency of rate filings, since "lag obstructs utilities' ability to earn their allowed return when costs are rising and can ultimately increase their borrowing costs. Electric utilities often fall short of achieving their allowed return due to regulatory lag" (Edison Electric Institute 2012). Economic concerns have also been at the forefront of regulators' minds and have resulted in lower approved ROEs by PUCs to buffer the financial impacts on ratepayers. However, the long-term influence leading to downward pressure on ROE values has been decreasing Treasury and corporate bond rates.

4.2. Allowed Return on Equity

Determining a just and adequate ROE is not an exact science, and is conditional on a variety of factors. However, an allowed level of ROE should correspond to the amount of risk a utility faces, while attracting the capital needed to ensure safe and reliable service at reasonable costs. It is necessary to determine the required level of ROE, as there are risks involved with a rate that is set too high or low. A rate that is set too high will lead to higher utility bills for residential, commercial, and industrial customers, and could slow the economic growth of the state (Boonin 2008). It can also lead to the Averch-Johnson effect, in which a utility company is incentivized to make unnecessary investments to increase shareholder returns (Averch and Johnson 1962). On the other hand, a rate that is set too low could restrict access to capital markets or dilute equity. This could lead to decreased electric grid reliability and quality of service.

5. Duke Energy Carolinas (DEC) Rate Case 2013

On February 4, 2013, Duke Energy Carolinas, LLC, filed a rate case with the NCUC to increase its retail electric rates and charges. DEC requested an increase in its annual retail revenues by $446 million dollars, or 9.7 percent, with an 11.25 percent return on equity (ROE) and a 53 percent equity capital structure (Duke Energy Carolinas 2012).

DEC has invested $3.8 billion in modernizing its infrastructure since its last rate case. Recouping this cost translates into $413 million, or 93 percent, of the total $446 million increase in annual retail revenues requested in the rate case. "The need to modernize the Company's system is also driven by ever-increasing environmental compliance requirements such as the need for emissions controls to comply with increasingly stringent state and federal emission regulations. The Company's modernization program is necessary to enable the Company to continue safely providing reliable and environmentally compliant electricity at reasonable costs for customers" (Duke Energy Carolinas 2012). Investments in Duke's modernization program include: $722 million on maintaining, upgrading, and modernizing its transmission and distribution systems, $590 million on its existing generating plants, and $292 million on other general and intangible assets related to operations (Duke Energy Carolinas 2012). The specific capital investments made in Duke's modernization program are broken out below:

Cliffside Steam Station Unit 6: $863 million

Cliffside Steam Station Unit 6 is a new 825 MW state-of-the-art advanced coal technology plant located on the Rutherford/Cleveland County line in North Carolina. It began construction in 2009 at an estimated cost of $1.8 billion, and came online in 2012. Cliffside Steam Station Units 1 through 4 were retired before the start of commercial operation of Unit 6 (Duke Energy Carolinas 2012).

Dan River Combined Cycle Station: $673 million

Dan River Combined Cycle Station is a new 620 MW natural gas facility in Rockingham County, NC. It began construction in 2011 and came online in 2012. The three coal units at the adjacent Dan River Steam Station were retired in 2012 (Duke Energy Carolinas 2012).

Oconee Nuclear Station: $448 million

Oconee Nuclear Station, an existing 2,548 MW nuclear station in Oconee County, SC, made plant modifications under updated regulatory standards by the U.S. Nuclear Regulatory Commission. The modifications involved tornado and high energy line break work (Duke Energy Carolinas 2012).

McGuire Nuclear Station: $203 million

McGuire Nuclear Station, an existing 2,200 MW nuclear station in Mecklenburg County, NC, revised technical specifications at Units 1 and 2 and implemented a measurement uncertainty recapture (MUR) power uprate. These updates increased generation capacity at McGuire by 80 MW (Duke Energy Carolinas 2012).

The remaining seven percent, or $33 million, of the rate case request is derived from changing costs, such as a storm reserve, end of life nuclear reserves, NRC order and regulation compliance costs, and vegetation management costs.

DEC's proposed annual revenue increase of $446 million would be recouped through higher rate schedules for all classes of customers: 11.8 percent for residential, 9.6 percent for general service, 5.3 percent for industrial and 5.4 percent for outdoor lighting (Duke Energy Carolinas 2012). Currently, a residential customer who uses 1000 kilowatt-hours (kWh) per month pays an electricity bill of $102.72. The approval of the rate schedule would increase the bill by $14.27 to a total of $116.99 per month (Duke Energy Carolinas 2013).

Lastly, separate from the rate increase, DEC has requested to reinstate a coal inventory rider of 0.03 cents per kWh across all customer classes, for a recovery of $18.3 million per year (Duke Energy Carolinas 2012).

5.1. DEC's Requested ROE of 11.25 Percent

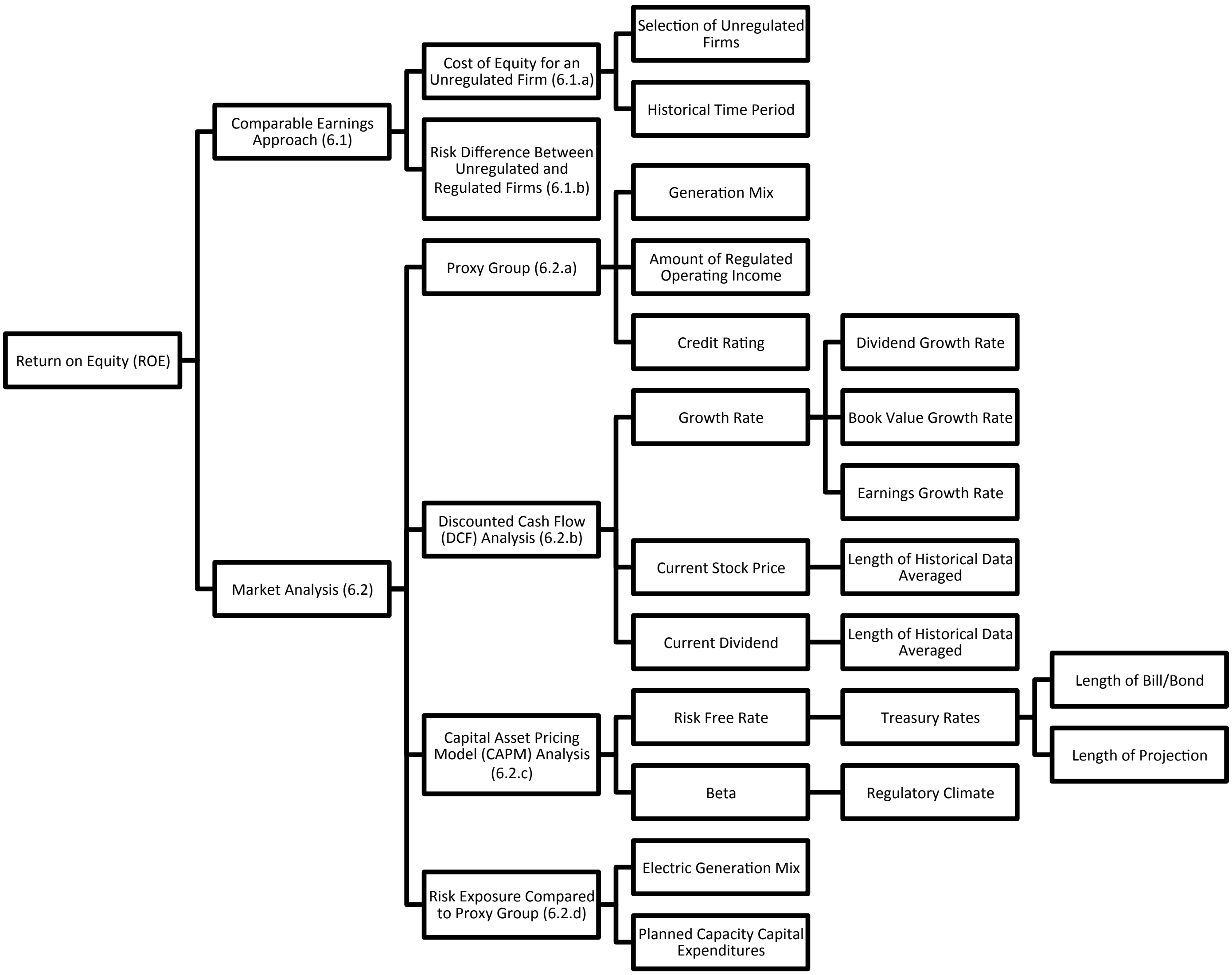
Duke Energy Carolinas' current approved ROE stands at 10.5 percent, and was settled in its last rate case in 2011. The 2013 rate case requests a higher ROE of 11.25 percent. Duke Energy Carolinas' financial analyst is Robert B. Hevert, Managing Partner of Sussex Economic Advisors, LLC Inc., who has worked in regulated industries for over 25 years. In his pre-filed direct testimony to the NCUC, he lays out his analysis for Duke Energy Carolinas' requested ROE of 11.25 percent. Hevert states that his "recommendation also takes into consideration the

Company’s need to fund substantial capital expenditures with respect to (1) providing safe and reliable electric service to a growing customer base; (2) retiring plants or making costly capital improvements due to more stringent environmental regulations for coal-fired generation; and (3) addressing increased regulatory mandates for nuclear generation” (Hevert 2013).

6. Determining the Required Return on Equity

Using a case study of the financial analysis for the most recent Duke Energy Carolinas Rate Case by Robert B. Hevert on behalf of Duke Energy Carolinas and the financial analysis for the previous Duke Energy Rate Case from 2011 by Ben Johnson on behalf of the NCUC Public Staff, we identified all the inputs required to determine the required ROE for any regulated utility. Figure 1 below illustrates the relationships between different inputs and the estimated ROE, and will be useful in designing a decision support tool for determining ROE values. Subsequent sections of this report (denoted in parentheses inside Figure 1) refer in detail to important factors affecting the ROE determination.

Figure 1. Regulatory Support Tool Framework



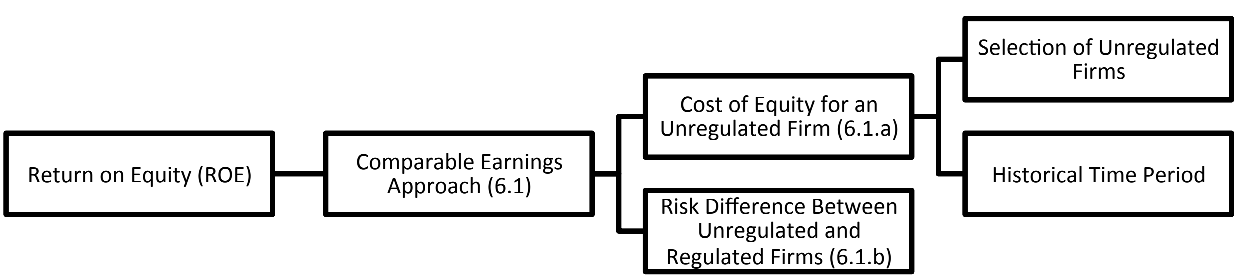
Historically, there have been two major approaches in regulatory proceedings used to estimate the cost of equity capital for a regulated utility: the Comparable Earnings Approach and the Market Analysis (Johnson 2011). Due to varying data sources, business cycles, investor biases, and other factors, these two approaches can produce different results that are dependent on variable time periods (Johnson 2011). Additionally, the two approaches are theoretically different. In the Comparable Earnings Approach, the analyst derives the utility's cost of equity from published data on the achieved returns that firms actually earn on their investments

(Johnson 2011). In the Market Analysis, the analyst attempts to calculate the cost of equity capital using data from the securities market (Johnson 2011). Furthermore, the Market Analysis can be broken down into two different types of analysis: Discounted Cash Flow (DCF) Analysis and Capital Asset Pricing Model (CAPM) Analysis.

6.1. Comparable Earnings Approach

The Comparable Earnings Approach analyzes published data on actual returns on equity for unregulated firms. The economic theory behind this approach is that "the return earned by the average firm in a competitive industry will tend to equal the opportunity cost of equity capital --- the return which could be earned by investing and operating in another industry while facing comparable risk" (Johnson 2011). This differs from the Market Analysis that attempts to calculate the ROE using securities market data. The regulatory basis for this type of analysis is based on the previously mentioned *Hope* court case that states that public utilities should be granted an ROE that is equal to the ROE of other firms with corresponding risks. In the Comparable Earnings Approach, it is up to the analyst to decide the firms selected for comparison and the historical time period from which the returns are taken. In order for the Comparable Earnings Approach to be applied to public utilities that are inherently monopolistic and regulated, the analyst creates an estimate of the risk difference between unregulated and regulated firms to arrive at the suggested ROE. The subjective inputs to the Comparable Earnings Approach are summarized in Figure 2.

Figure 2. Comparable Earnings Approach Inputs



6.1.a. Cost of Equity for an Unregulated Firm

The first area of subjectivity in the Comparable Earnings Approach is in determining the cost of equity for an unregulated firm. Although this calculation is based on historical data, it is subject to two main inputs: the unregulated firms whose data is used for the calculation and the range of historical data used in the analysis.

6.1.b. Risk Difference Between Unregulated and Regulated Firms

Because the cost of equity for the average regulated utility is significantly lower than that of the average unregulated, competitive firm, the financial analyst then estimates the difference in risks faced. The analyst does this by comparing the overall utility industry to the typical unregulated firm in addition to comparing the individual utility to the entire utility industry.

The public utility industry faces significantly less risk than a typically unregulated firm. Whether a utility is operating in a regulated or unregulated service territory, there are significant and large barriers to entering the market due to the required economies of scale and structure of the U.S. electric power sector. Additionally, electric utilities face less risk than other industries because the demand for electricity is relatively inelastic (Johnson 2011).

Case Study: Duke Energy Carolinas Comparable Earnings Approach

Although Ben Johnson used a Comparable Earnings Approach as part of his analysis in the 2011 rate case, Hevert left this approach out from his ROE recommendation in 2013. Below is a summary of Johnson's Comparable Earnings Approach:

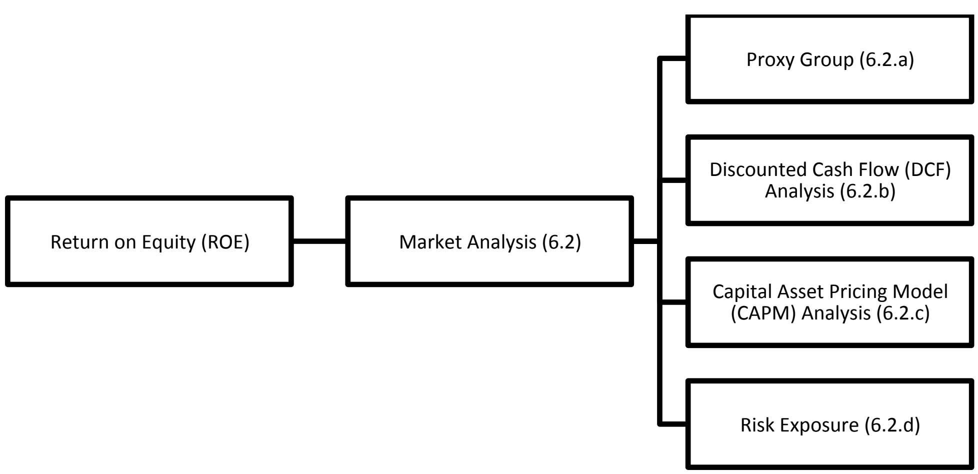
1) "Studied the rates of return on average common equity earned by unregulated (primarily industrial) firms
2) On the basis of the historical earnings of these firms and an analysis of current economic conditions, estimated the current cost of equity capital to the average unregulated industrial firm
3) Examined the relative risk of utilities versus industrial firms and estimated the current cost of equity for various types of utilities, including electric companies.
4) Used the latter as a benchmark in deriving his comparable earnings-based estimate of the Company's cost of equity, taking into account his opinion concerning the level of equity risk that is specifically applicable to Duke Energy Carolinas" (Johnson 2011).

In Johnson's analysis, he concludes that the long-term "normal" level of earnings, and thus the opportunity cost of equity capital, for a typical unregulated firm is in the neighborhood of 12.5 percent to 14.5 percent (Johnson 2011). He then estimates the risk-based difference in equity cost between the average unregulated competitive firm and the average energy utility as approximately three percent and concludes that DEC's required ROE using the Comparable Earnings Approach is in the range of 9.75 percent to 10.75 percent (Johnson 2011).

6.2. Market Analysis

The other type of analysis used in determining the required return on equity is a Market Analysis using securities market data. This approach is the most common for ROE recommendations and uses more detailed calculations that incorporate both historical and projected assumptions. The economic theory behind this type of analysis is that "in a competitive market, the returned earned on one security will tend to equal the returns earned on other securities of comparable risk" (Johnson 2011). When a utility is a subsidiary for a larger, publically traded company or when the analyst is trying to level out short-term market events that might bias the analysis, a proxy group must be created. Using this proxy group, the required ROE is calculated by applying the CAPM and DCF methods. A recommendation is then made that takes into account the differences in risk exposure between the utility and the proxy group. Figure 3 summarizes the Market Analysis inputs.

Figure 3. Market Analysis Inputs

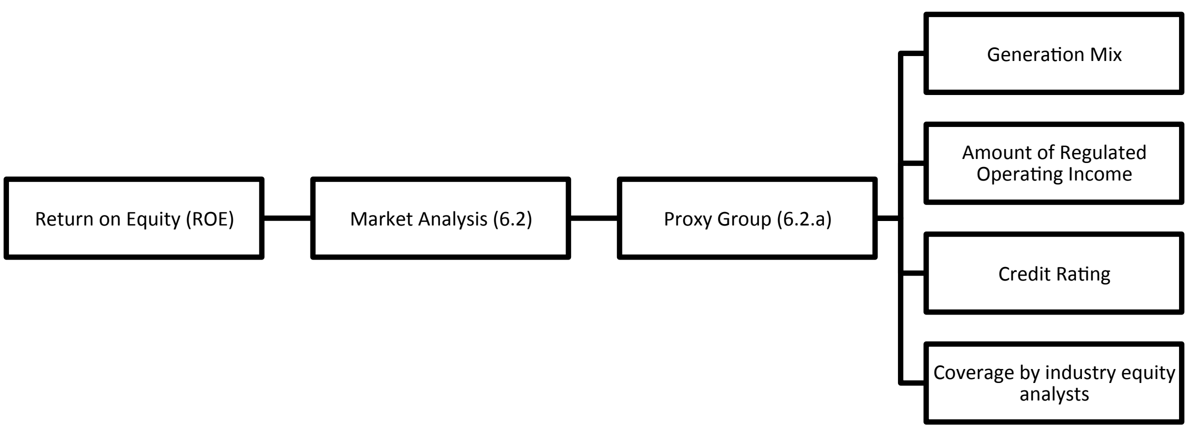


6.2.a. Proxy Group Analysis

In the case of subsidiary companies, a proxy group must be used to calculate the required ROE using the DCF and CAPM methods. Even if the subsidiary were a publically traded entity, "it is possible that short-term events could bias its market value in one way or another during a given period of time" (Hevert 2013). "A significant benefit of using a proxy group, therefore, is that it serves to moderate the effects of anomalous, temporary events that may be associated with any one company" (Hevert 2013).

The proxy group is a subset of the 49 Value Line Classified electric utilities in the U.S. and the selection criteria for its creation is highly subjective, but typically accounts for generation mix, amount of regulated operating income, and credit rating of the proxy utilities. It is challenging to determine thresholds of similarity on selected criteria and create a proxy group that matches the business and risk characteristics of the regulated utility. Figure 4 summarizes the subjective inputs that financial analysts use to determine which utilities should be included in the proxy group.

Figure 4. Proxy Group Inputs



Case Study: Duke Energy Carolinas Proxy Group Selection

Due to the fact that Duke Energy Carolinas is a subsidiary of Duke Energy, the approach of looking at a proxy group was followed by both Robert Hevert in the 2013 rate case and Ben Johnson in the 2011 rate case. Duke Energy was left out of the proxy group because of its engagement in unregulated and overseas business activities, which leads to different business characteristics, risk profiles, and financing needs than the regulated operations of Duke Energy Carolinas (Hevert 2013).

With the objective of creating a proxy group that reflects the risks and opportunities of Duke Energy Carolinas, Hevert narrowed down the group of 49 Value Line classified electric utilities to 11 by applying the following selection criteria:

- "Consistent quarterly cash dividend payments
- Coverage by at least two utility industry equity analysts
- Investment grade senior bond and/or corporate credit ratings from Standard and Poor's
- Vertically integrated utility
- Regulated operating income over the last three fiscal years is greater than 60 percent of the totals for the company
- Regulated electric operating income over the last three fiscal years is greater than 90 percent of total regulated operating income
- Greater than ten percent of net generation from coal-fired power plants
- Not in the midst of a merger or significant transaction" (Hevert 2013)

Hevert ended up with a proxy group of 11 electric utilities: American Electric Power Company, Inc., Cleco Corporation, Empire District Electric Company, Great Plains Energy Inc., IDACORP, Inc. Otter Tail Corporation, Pinnacle West Capital Corporation, PNM Resources, Inc., Portland General Electric Company, Southern Company, and Westar Energy, Inc. (Hevert 2013). The approved ROEs and approved equity ratios for the proxy groups selected by Hevert are presented in Table 2. Hevert states that Duke Energy Carolinas has a higher risk profile than the selected proxy group and therefore has an even higher required ROE than was calculated by the Market Analysis and Comparable Earnings Approach (Hevert 2013).

Table 2. Final Proxy Group from Hevert's Analysis

Company	Ticker	Approved ROE	Approved Equity
American Electric Power Company, Inc	AEP	10.20% [1]	53.00% [1]
Cleco Corporation	CNL	10.70% [2]	51.00% [2]
Empire District Electric Company	EDE	10.80% [3]	50.00% [3]
Great Plains Energy Inc.	GXP	9.70% [4]	52.60% [4]
IDACORP, Inc.	IDA	10.50% [5]	53.00% [5]
Otter Tail Corporation	OTTR	10.50% [6]	52.00% [6]
Pinnacle West Capital Corporation	PNW	9.50% [7]	51.50% [7]
PNM Resources, Inc.	PNM	10.00% [8]	50.00% [8]
Portland General Electric Company	POR	10.00% [9]	50.00% [9]
Southern Company	SO	11.15% [10]	50.50% [10]
Westar Energy, Inc.	WR	9.50% [11]	51.00% [11]

Alternatively, Ben Johnson includes 41 proxy utilities in his 2011 analysis because he believes a larger proxy group size provides a more objective analysis (by reducing the impact that any single utility will have on the results). He then leaves it up to the Commission to decide whether it believes the adjustments in the calculated ROEs of the proxy group are justified (Johnson 2011).

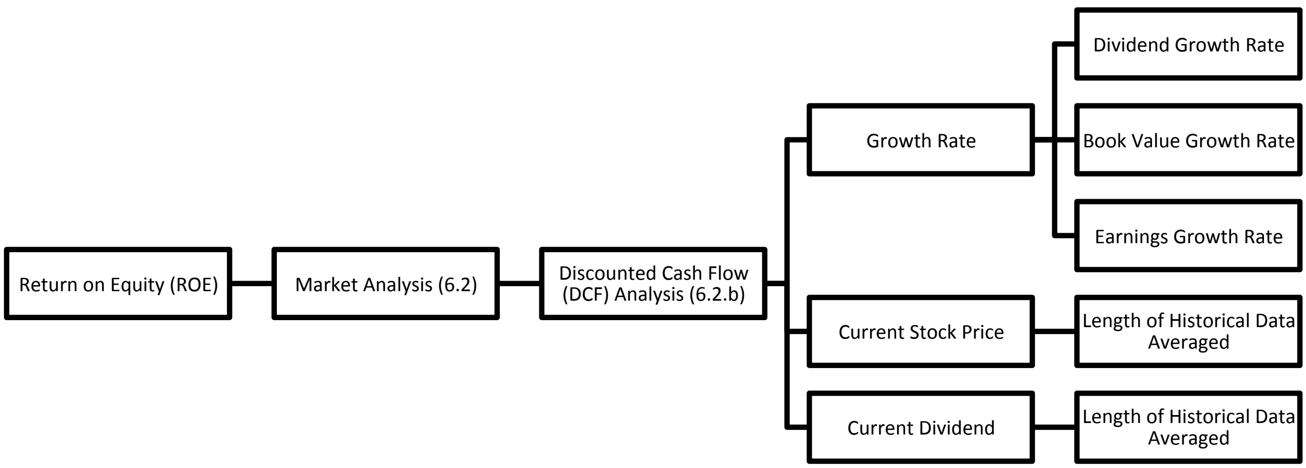
6.2.b. Constant Growth Discounted Cash Flow (DCF) Analysis

The constant growth discounted cash flow (DCF) model is widely used in utility regulatory proceedings and is the most common method to calculate the ROE. This method "is based on the theory that a stock's current price represents the present value of its future expected cash flows" (Hevert 2013). The required ROE is calculated using the following formula where P is the current stock price, $D_1 \ldots D_\infty$ are future dividends, and k is the discount rate, or ROE.

$$P = \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \cdots + \frac{D_\infty}{(1+k)^\infty}$$

Although the DCF seems straightforward, its components are highly subjective. There are no guiding principles on selecting a current dividend, market price, and growth rate, thus complicating the calculation of an objective DCF. Moreover, these factors can span a wide or narrow time period and represent an aggressive or conservative strategy, ultimately leading to a higher or lower ROE. Figure 6 summarizes the inputs to the DCF calculation and the following sections describe the variability and considerations for these inputs.

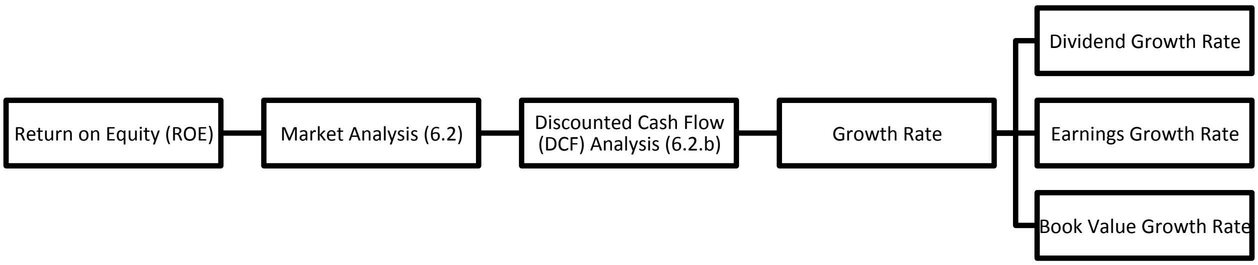
Figure 5. Constant Growth Discounted Cash Flow (DCF) Inputs



Growth Rate

As mentioned previously, in order to calculate a required ROE for a regulated utility using the DCF model, it is necessary to assume a long-term dividend growth rate for the company. "Since growth is a multidimensional phenomenon, no single variable proves adequate in fully describing a firm's growth, or investor expectations concerning that growth" (Johnson 2011). "This becomes apparent when studying historical growth statistics, since they vary widely depending on the type of growth measured and the time period selected" (Johnson 2011). Therefore, there are three types of growth that should be considered when projecting a long-term dividend growth rate for a company: dividend growth, earnings growth, and book value growth (Figure 7).

Figure 6. Growth Rate Inputs



Long-term future dividend growth is most relevant to a DCF analysis because this rate is used in the DCF model calculations. However, dividend growth rates can vary widely over time and are largely dependent on what data is averaged. Additionally, rapid dividend growth over short periods of time is only sustainable if earnings growth follows (Johnson 2011). Therefore, "short periods of historic dividend growth do not always provide a good indicator of long-term future dividend growth" and it is helpful to also look at historical book value growth or projected earnings growth (Johnson 2011).

Book value, or total assets minus intangibles, is useful to examine when considering the dividend growth for a utility because it precedes earnings and dividends per share growth (Johnson 2011). This is due to the fact that book value closely tracks the underlying growth in equity capital per share (Johnson 2011). Therefore, if book value is growing, "investors can anticipate growth in earnings and dividends in the future, even if dividends and earnings have been stagnant or declining in the recent past" (Johnson 2011). Additionally, book value growth generally shows less fluctuation than those in dividends and earnings (Johnson 2011).

Projected earnings growth is important to include in the long-term dividend growth rate estimate because it reflects investors' future expectations of growth, which are used in a DCF analysis (Johnson 2011). However, earnings projections by financial analysts can be overly optimistic and contain a considerable amount of bias because they are focused on near-term earnings. This is due to the fact that the primary focus of most investment analysts is trying to predict the earnings that will be reported during the next few quarters.

The inevitable imprecision of investment analyst projections of earnings growth makes it necessary to include an evaluation of historical growth rates in financial analysis for determining required ROE values. Projected long-term growth rates are more likely to follow historic long-term trends than short-term projections (Johnson 2011). Additionally, historical data levels out month-to-month and year-to-year fluctuations than can cause problems when doing market analysis (Johnson 2011).

In order to fully develop an understanding of what long-term dividend growth will be for a company, various projected growth rates and historical growth rates must be taken into consideration. This includes doing an analysis on dividend, earnings, and book value future and historical growth rates. Care must also be taken to analyze different subsets of time periods within each type of growth rate because averaging different years or months of data can produce wildly different results due to short-term fluctuations and oscillations in security prices. Interpreting these fluctuations and creating a projection that filters out the background noise of stock speculations and economic variability is the most difficult part of constructing a comprehensive DCF model or any kind of model that used market analysis (Johnson 2011).

Current Dividend and Stock Price

To account for any outliers and anomalies in a given trading day, a historical average of dividends and stock prices are used in the DCF model. Similar to historical growth rates, current dividend amounts and stock prices can vary widely depending on what data is averaged. Additionally, the assumption that the current stock price represents the present value of its future expected cash flows is challenged by the fact similar to energy commodities, such as oil and gas, speculations can affect securities prices.

Case Study: Duke Energy Carolinas DCF Analysis

The analyses by Robert Hevert and Ben Johnson show the effects of using various growth rates and time periods for current stock price and dividends, as well as growth rates on the DCF results.

Hevert chooses only to focus on earnings growth in his analysis because over the long-term "dividend growth can only be sustained by earnings growth" (Hevert 2013). He states that the need to reduce long-term growth rate to a single measure for the DCF analysis means that "earnings per share, dividends per share, and book value per share are assumed to grow at the same constant rate" (Hevert 2013). Hevert did not consider any historical dividend, earnings, or book value growth rates in his analysis. Instead, he based the long-term dividend growth rate for the 11 companies in the selected proxy group on the estimates produced by the investment analysis companies: Value Line, Zack's, and First Call. Each company reports three types of rates: the lowest projected growth rate, the average projected growth rate, and the highest projected growth rate (Hevert 2013). The mean proxy group growth rate he derives is 5.87 percent (Hevert 2013). Johnson's testimony shows that the historical earnings per share growth rate was 1.6 percent for the 41 utilities included in the selected proxy group between 2004 to 2010 (Johnson 2011). The growth rate that Johnson uses ranges from 4 to 4.5 percent and is derived from a variety of historical and projected data that includes the three types of growth rates previously mentioned (Johnson 2011). The variability in these two estimates shows how the proxy group selection, time period selected, and investment projections can affect the resulting growth rates used.

Hevert used three averaging periods of 30, 90, and 180-days to calculate average stock prices and average dividends for the selected proxy group utilities (Hevert 2013). The results of Hevert's constant growth DCF model are shown in Table 3. Highlighted in blue are the required ROE results that are greater than or equal to 11.25 percent, which is Duke Energy Carolinas' current allowed ROE. The results show that the average required ROE for the proxy utilities is higher than Duke Energy Carolina's current ROE only during the high growth rate scenario.

Table 3. Summary of Hevert's Constant Growth DCF Results

	Low Growth Rate	*Mean Growth Rate*	*High Growth Rate*
Proxy Group Mean			
30-Day Average	8.84%	10.15%	**11.66%**
90-Day Average	8.76%	10.06%	**11.58%**
180-Day Average	8.81%	10.12%	**11.64%**
Proxy Group Median			
30-Day Average	9.60%	9.98%	**11.32%**
90-Day Average	9.44%	10.10%	**11.25%**
180-Day Average	9.36%	10.27%	**11.30%**

6.2.c. Capital Asset Pricing Model (CAPM) Analysis

The Capital Asset Pricing Model (CAPM) is also a commonly used method to calculate the required ROE in utility rate cases and is a "risk premium approach that estimates the Cost of Equity for a given security as a function of a risk-free return plus a risk premium" (Hevert 2013). In the following equation, the required ROE is derived based on forward-looking factors.

$$k = r_f + \beta(r_m - r_f)$$

k is the required ROE

β is a coefficient that measures the relationship between an investment's return and the returns of financial market as a whole

r_m is the required return on the market as a whole

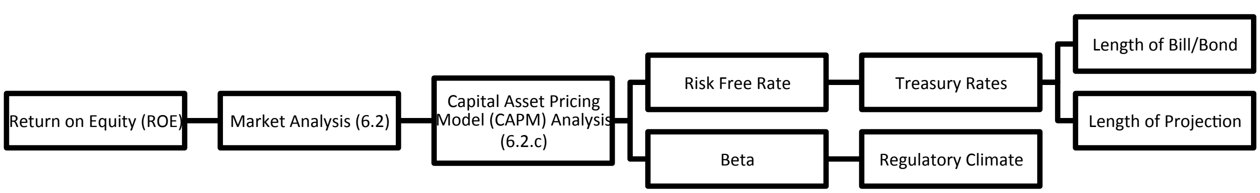
r_f is the risk free rate of return

A simplification of this equation is below:

*Required ROE = Risk-free Rate + Market Return Premium*Beta*

The important underlying assumptions that are subjective in the CAPM analysis are the risk-free rate of return and the beta coefficient. Figure 9 summarizes the inputs to the Capital Asset Pricing Model (CAPM) Analysis for determining the required ROE of a regulated electric utility.

Figure 7. Capital Asset Pricing Model (CAPM) Inputs



Risk-Free Rate

The risk-free rate of return is a hypothetical rate based on the return received for investing in a security that has no risk. Treasury rates are typically used as a proxy for the risk-free rate because they are assumed to have zero default risk since they are backed by the U.S. government (Investopedia n.d.). However, the length of Treasury bonds or bills whose rates should be used as a proxy is contentious and not standardized in the regulated utility industry, nor is the length of the rate projection. Consequently, financial analysts weigh the pros and cons of the length of the bond or bill used. For example, a 30-year Treasury bond might more closely match the lifetime of a typical utility investment. However, 30-year bonds have higher inflation risks than do shorter Treasury bonds or bills. Additionally, financial analysts use projected Treasury rates that are based on different time periods, which can affect the CAPM results depending on the length of the bond. Depending on how often the regulated utility files rates cases, a long-term projection may not be needed. Regardless of the risk-free rate assumed by a financial analyst, it is important for a public utility commission to acknowledge that the range of risk-free rates that could be assumed varies by roughly five percent and is subject to the length of bill or bond used and the length of the projection period.

Beta

The beta of an investment is a measure of its systematic risk or relationship between its return and the returns of the financial market as a whole (Johnson 2011). A positive beta indicates that the investments returns tend to follow the returns of the overall market (Johnson 2011). An investment with a beta greater than one has returns that tend to vary more than the overall market returns, while an investment with a positive beta of less than one has returns that tend to vary in the same direction as, but by a lesser degree than the overall market (Johnson 2011). The beta in CAPM calculations is usually taken from an average of the proxy group betas, therefore the assumption is subject to the difference between the regulated utility and the proxy group utilities risk characteristics that will be discussed in Section 6.2.d.

Case Study: Duke Energy Carolinas CAPM Analysis

Hevert used three estimates of the risk-free rate in his analysis: “the current 30-day average yield on 30-year Treasury bonds, the projected 30-year Treasury yield based on the six quarters prior to March 2014, and the long-term projected 30-year Treasury yield based on 2014 to 2023” (Hevert 2013). As previously mentioned, using a long-term projected 30-year Treasury rate may not be necessary because historically, Duke Energy Carolinas has filed a rate case every one to two years. Additionally, Hevert uses the average beta coefficients of the proxy utilities as determined by Bloomberg and Value Line. Ben Johnson argues that the beta for Duke Energy Carolinas would logically be less than that of the proxy group because of the favorable legislative and regulatory climate in North Carolina (Johnson 2011).

The results of Hevert's CAPM analysis are shown in Table 4. Highlighted in blue are the ROE results that are greater than or equal to 11.25 percent. The required ROE is higher than the current allowed ROE only when applying the long-term projected 30-year Treasury rate.

Table 4. Summary of Hevert's CAPM Results

	Sharpe Ratio Derived Market Risk Premium	*Bloomberg Derived Market Risk Premium*	*Capital IQ Derived Market Risk Premium*
Average Bloomberg Beta Coefficient			
Current 30-Year Treasury (2.85%)	7.68%	9.93%	9.97%
Near Term Projected 30-Year Treasury (3.14%)	7.97%	10.21%	10.25%
Long-Term Projected 30-Year Treasury (5.10%)	9.93%	**12.17%**	**12.21%**
Average Value Line Beta Coefficient			
Current 30-Year Treasury (2.85%)	7.78%	10.07%	10.11%
Near Term Projected 30-Year Treasury (3.14%)	8.07%	10.36%	10.40%
Long-Term Projected 30-Year Treasury (5.10%)	10.03%	**12.32%**	**12.36%**

6.2.d. Risk Exposure Compared to Proxy Group

Regulated utilities have varying levels of risk exposure that derive from the utility's specific characteristics and regulatory structure. Utility characteristics that affect risk exposure include "capital structure, growing or shrinking demand or customer base, customer mix, vertically integrated or restructured, corporate structure, capital expenditure program, and generating mix" (Boonin 2008). Regulatory risks to take into consideration include "project preapproval, CWIP in rate base, decoupling and income volatility in rate structure, depreciation rate, inter-rate case cost recovery, test year, and expense and revenue adjustments" (Boonin 2008).

The financial analyst submitting the rate case must assess the risk profile of the proxy group and determine whether its company faces an overall higher or lower risk than the selected group. The determination of the risk exposure faced by the utility compared to the proxy group leads to an adjustment of the recommended ROE values derived from the DCF and CAPM

Analysis. A higher risk exposure than the proxy group would justify a higher ROE value, while a lower risk exposure would justify a lower ROE value.

Although the components of a utility characteristics and regulatory risks are easily identified, it is difficult to quantify their combined effects into a risk exposure level and their total effect on the required ROE.

Case Study: Duke Energy Carolinas Risk Exposure

According to Hevert, Duke Energy Carolinas faces a greater risk exposure than its proxy group and recommends an upward adjustment for the required ROE. He points to "the risk of plant retirements and costly capital improvements due to more stringent environmental regulations for coal-fired generation, and the level of nuclear generation owned by the Company and the associated risk of increased expenditures to comply with new regulatory mandates" (Hevert 2013).

These two reasons cited by Hevert for inflating the ROE of the proxy group illustrate the subjectivity of the arguments that can be made in an ROE determination. One could, for example, state that the risk tied to coal generation is questionable, as Hevert's proxy group includes utilities that have greater than ten percent of net generation from coal-fired power plants. Furthermore, it could be argued that most of the risks associated with coal generation, such as compliance with environmental regulations or increased storage costs, are likely to be passed onto ratepayers.

Similarly, it could be argued that the risk tied to nuclear generation is also questionable, since the costs from regulatory mandates are also likely to be passed through to ratepayers, as illustrated in the current Duke Energy Carolinas case, which includes the cost recovery of $448 million in upgrades at the Oconee Nuclear Station under mandates by the U.S. Nuclear Regulatory Commission.

Another argument against the claim that coal and nuclear generation imply higher risks is the fact that the other main source of baseload generation, natural gas, involves a very high fuel price risk that is exacerbated by the difficulty of securing long-term contracts.

7. Recommendations

7.1. Industry Standards for Comparable Earnings Approach and Market Analysis Inputs

Regulated utilities, PUCs, and ratepayers would all benefit from industry standards on the subjective components of the Comparable Earnings Approach and Market Analysis. There is a need for terms and stipulations for the following inputs: the historical time period for market data, growth rate, length of historical data averaged for the current dividend and current stock price, and length of bill or bond and projection for Treasury rates and bonds. Setting consistent standards for these components would narrow down the wide range of required ROE values that are derived from the Comparable Earnings Approach and Market Analysis, and reduce the subjectivity in determining a fair ROE.

Industry standards would benefit regulated utilities by increasing certainty in rate cases and reducing regulatory lag, the time between submitting and approving a rate case. It would assist PUCs by enabling them to compare and evaluate rate cases from the diverse regulated utilities operating within the state. Standards would also prevent overinflated estimates that hurt ratepayers and weaken the state economy. It would ensure that ratepayers are paying fair and reasonable rates for reliable service.

7.2. Utility Proxy Group Database

A database on proxy utilities would benefit regulated utilities and PUCs by expediting the rate case analysis process and reducing regulatory lag. The proxy group database would include detailed data on the 49 Value Line Classified electric utilities in the U.S., specifically on the current generation mix, amount of regulated operating income, credit rating, coverage by industry equity analysts, beta, stock price data, and dividend data. This would allow PUCs to quickly create proxy groups that reflect the risk profile of the utility submitting the rate case. A proxy group database might also be helpful to feed into a DCF and CAPM Analysis model. This resource would be useful in providing more information to PUCs to make better decisions.

7.3. Online-Based Productivity Network for PUCs

PUCs operate on a case-by-case and state-by-state basis and have limited connection with other PUCs. An online-based productivity network could allow PUCs to share resources and best practices with one another. PUCs would be able to identify similar commissions that share resource characteristics, regulatory environments, regional climates, or operating utilities, in order to discuss challenges and solutions. PUCs could also track trends in rate cases and IRPs, learn about innovative regulation design in other states, and coordinate on interstate issues.

8. Conclusion

This case study analysis of the Duke Energy Carolinas rate cases from February 2013 and July 2011 and regulatory support tool framework outlines the subjective and objective components within the Comparable Earnings Approach and Market Analysis models. These two types of analysis are the main methods to determine required ROE values for a regulated utility. The ROE value is the most contentious and controversial part of a rate case, mostly due to the subjectivity of its inputs. We recommend an industry standard for the subjective components in the Comparable Earnings Approach and Market Analysis models, which would benefit regulated utilities, PUCs, and ratepayers. The end result would be a fair ROE that reflects the risk of a utility, allows access to capital, and results in reliable electricity at a fair cost to ratepayers. There is also a need for more resources for PUCs, which could take the form of a utility proxy group database and online-based productivity network.

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<u>Sources for Table 2: Final Proxy Group from Hevert's Analysis</u>

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