BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Pacific Gas and Electric Company for Authority to Establish Its Authorized Cost of Capital for Utility Operations for 2023 and to Reset the Cost of Capital Adjustment Mechanism.	Application 22-04-008 (Filed April 20, 2022)
And Related Matters.	Application 22-04-009 (Filed April 20, 2022) Application 22-08-011 (Filed April 20, 2022) Application 22-08-012 (Filed April 20, 2022)

PHASE 2 OPENING TESTIMONY OF MARK E. ELLIS

ON BEHALF OF THE PROTECT OUR COMMUNITIES FOUNDATION

JANUARY 29, 2024

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I. INTRODUCTION

A. Qualifications

Q. Please state your name and professional affiliation.

A. My name is Mark E. Ellis. I am an economic and financial consultant. My business address is 8595 Nottingham Place, La Jolla, CA 92037.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of The Protect Our Communities Foundation (PCF).

Q. Do you certify under penalty of perjury that, to the best of your knowledge, the testimony you will give in this proceeding is true and correct?

A. Yes.

Q. Please summarize your education and professional work experience.

A. I graduated from Harvard University with a Bachelor of Science in Mechanical and Materials Sciences and Engineering and from the Massachusetts Institute of Technology with a Master of Science in Technology and Policy.

I have over 30 years of professional experience in the energy industry. Before starting my consulting practice in 2020, I led the strategy function at Sempra Energy for fifteen years. My responsibilities included developing and implementing the enterprise-wide cost of capital estimation process. This critical corporate finance function entailed thorough and ongoing research of the academic and practitioner literature on the historical cost of capital and the various cost of capital estimation methodologies and models; creating a process to estimate, quarterly, the forward-looking, risk-adjusted cost of capital for Sempra's portfolio of companies spanning a variety of geographies and lines of business; and calibrating the results against historical data and reputable, objective third-party estimates.

Previously, I held various positions in strategy, project development, and engineering with McKinsey, ExxonMobil, Southern California Edison, and Sanyo Electric.

In 2023, I provided expert testimony on behalf of The Protect Our Communities Foundation (PCF) before the California Public Utilities Commission (CPUC) in Phase 1 of this proceeding. In 2022, I provided expert testimony on behalf of PCF before the CPUC in

1   the three California Utilities' consolidated applications (A.21-08-013 et seq.) to suspend the

2   Cost of Capital Mechanism (CCM). In 2020, I provided expert testimony on behalf of The

3   Utility Reform Network (TURN) before the CPUC in PG&E's application (A.21-20-04-23)

4   for a $7.5-billion wildfire cost securitization. I have also recently testified on the rate of

5   return in North Carolina, Georgia, Wisconsin, and New Hampshire. Attachment MEE-1

6   contains more detail about my background.

7

8   **B.   Testimony Summary**

9   **Q. What is the purpose of your testimony in this proceeding?**

10   A. I have been asked by PCF to assess and develop recommendations regarding the following

11   question outlined in the Scoping Memo: "[w]hether other policy modifications should be

12   ordered with regard to future cost of capital application cycles."[1] This question includes,

13   *inter alia,* "[a]ppropriate methodologies for calculating return-on-equity," "[m]easures to

14   prevent circularity, self-reference, and status quo biases;" and "affordability considerations."[2]

15

16   **Q. Please summarize your testimony.**

17   A. I make the following seven recommendations for modifications that should be ordered with

18   regard to future cost of capital application cycles, each supported by detailed analysis and

19   other evidence:

20   (1) The Commission should find that the goal of CPUC cost of capital proceedings is to

21   estimate the Utilities' respective *costs* of capital. I provide abundant, robust evidence

22   demonstrating that authorized returns in California and nationwide far exceed the

23   requirements of *Hope* and other legal and regulatory standards requiring regulators to allow

24   utility investors an "opportunity to earn returns sufficient to 'attract capital.'"[3]

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[1] A.22-04-008 et seq., Assigned Commissioner's Ruling Consolidating Four Applications and Scoping Memo and Ruling (July 12, 2022), p. 3; A.22-04-008 et seq., Administrative Law Judge's Ruling Outlining Phase 2 Issues and Schedule (October 31, 2023), p. 2.

[2] A.22-04-008 et seq., Administrative Law Judge's Ruling Outlining Phase 2 Issues and Schedule (October 31, 2023), p. 3-4.

[3] *Tennessee Gas Pipeline Co. v. FERC* (D.C. Cir.) (1991) 926 F.2d 1206, 1208; *Fed. Power Comm'n v. Hope Nat. Gas Co.* (1944) 320 U.S. 591, 605 ("Rates which enable the company to operate successfully, to maintain its financial integrity, to attract capital, and to compensate its investors for the risks assumed certainly cannot be condemned as invalid, even though they might produce only a meager return on the so-called 'fair value' rate base.")

1   (2) The Commission should find that capital structure and ROE are interdependent; and

2   the Commission should order the Utilities to provide evidence sufficient to allow the

3   Commission to determine capital structure and ROE jointly, incorporating consideration of

4   key metrics used by credit rating agencies.

5   (3) The Commission should follow the example of FERC in prohibiting the use of

6   financial models based on historical authorized ROEs, like the Risk Premium Model, due to

7   their inherent circularity.

8   (4) The Commission should follow the example of FERC in prohibiting the use of

9   financial models based on historical or forecast book ROEs, like the Expected Earnings

10   Analysis, due to their inherent circularity.

11   (5) The Commission should prohibit projecting analysts' 3-to-5-year growth forecasts

12   into perpetuity in the DCF model, due to their limited forecast horizon and economically

13   impossible implications.

14   (6) The Commission should prohibit, in the implementation of the CAPM, several

15   common assumptions, data sources, and modifications, due to their lack of conceptual or

16   empirical validity.

17   (7) The Commission should investigate the causes of Utilities' persistent cost of debt

18   over-collection and implement measures to minimize it.

19   Figure 1 lists each of my recommendations and its rationale.

1   **Figure 1. Summary of recommendations**

Recommendation	Rationale
1. Find rate of return must be equal to the cost of capital	• Persistent confusion and misunderstanding despite well-established legal, regulatory, and economic standard
2. Require integrated quantitative analysis of equity ratio, ROE, and credit quality	• Critical to any meaningful analysis and to credit rating agencies and investors
3. Prohibit models based on authorized ROE, e.g., Risk Premium Model	• Do not produce a market-based COC (confuse ROR and COC)
4. Prohibit models based on historical or forecast book ROE, e.g., Expected Earnings Analysis	• Not used elsewhere in finance • Rejected by FERC
5. Prohibit, in the DCF, projection of analysts' 3-to-5-year growth forecasts into perpetuity	• Forecasts valid only 3 to 5 years • Produces economically impossible results
6. Prohibit, in the implementation of the CAPM, several common flawed assumptions, data sources, and modifications	• Lack conceptual or empirical validity
• Forecast interest rates	• Inconsistent with DCF timing • Systematic upward bias • Current rate is best available predictor
• Single source for beta	• Different calculation methods can produce widely varying results over time • Multiple sources should be examined
• Adjusted beta	• Not valid for utilities
• Forward-looking MRP: CG DCF w/ analyst growth rates	• Forecasts valid only 3 to 5 years • Produces economically impossible results
• Historical MRP – Income-only, not total, bond returns	• Inconsistent with use of realized total returns for market • Not an investable asset
– Arithmetic, not geometric, average returns	• Geometric better reflects long-term investor expectations
• ECAPM	• Invalid application of academic research: utility (long-term) cost of capital is not analogous to the (short-term) research on which ECAPM is based • No independent research or textbooks endorsing ECAPM • Adjusting for long-term utility COC, research findings do not hold
7. Investigate and minimize persistent cost of debt over-collection	• Material impact on customer costs – and executive compensation • Not completely explained by upwardly biased interest rate forecasts

2

1 **Q. Please concisely state any proposed ordering paragraphs that the Commission should**
2 **issue in the second phase of this proceeding.[4]**

3 A. The Commission should order that the purpose of its cost of capital proceedings is to set a
4 utility's rate of return on equity equal to its cost of equity capital.

5 The Commission should order the Utilities to provide evidence sufficient to allow the
6 Commission to determine capital structure and ROE jointly, incorporating consideration of
7 key metrics used by credit rating agencies.

8 The Commission should prohibit the use of the Risk Premium Model because it is circular,
9 based on historical authorized ROEs.

10 The Commission should prohibit the use of the Expected Earnings Analysis because it is
11 circular, based on historical or forecast book ROEs.

12 The Commission should order that, when utilizing the DCF model in cost of capital
13 proceedings, parties shall not project analysts' 3-to-5-year growth forecasts into perpetuity.

14 The Commission should order that, when utilizing the CAPM in cost of capital proceedings,
15 parties shall not utilize common assumptions, data sources, and modifications that lack
16 conceptual or empirical validity.

17 The Commission should order an investigation into the causes of the Utilities' persistent cost
18 of debt over-collection.

19 The Commission should order the development of measures to minimize the Utilities'
20 persistent cost of debt over-collection, informed by the results of the investigation into the
21 causes of the Utilities' persistent cost of debt over-collection.

22

23 **Q. Please concisely state any specific findings and conclusions of law that would justify the**
24 **proposed orders.[5]**

25 A. The Commission should find that the purpose of its cost of capital proceedings is to set a
26 utility's rate of return on equity equal to its cost of equity capital.

27 The Commission should conclude that the "cost of capital is the minimum rate of return
28 necessary to attract capital to an investment."[6]

29 The Commission should find that capital structure and ROE are interdependent.

30 The Commission should find that the Risk Premium Model is based on historical authorized
31 ROEs.

1   The Commission should find that the Expected Earnings Analysis is based on historical or

2   forecast book ROEs.

3   The Commission should find that the Risk Premium Model and the Expected Earnings

4   Analysis are circular.

5   The Commission should find that, when utilizing the DCF model, projecting analysts' 3-to-5-

6   year growth forecasts into perpetuity involves the invalid and unrealistic use of these

7   forecasts, which have a limited forecast horizon, and economically impossible implications.

8   The Commission should find that parties should not, when utilizing the DCF model in cost of

9   capital proceedings, project analysts' 3-to-5-year growth forecasts into perpetuity.

10   The Commission should find that parties should not, when utilizing the CAPM in cost of

11   capital proceedings, include assumptions, data sources, and modifications that lack

12   conceptual or empirical validity.

13   The Commission should find that the Utilities' persistent cost of debt over-collection

14   warrants an investigation of the causes of the persistent debt over-collection.

15   The Commission should find that measures to minimize the Utilities' persistent cost of debt

16   over-collection should be implemented based on the findings of the investigation of the

17   causes of the persistent debt over-collection.

18   I summarize the evidentiary basis for each of these in Figure 1, and below I provide the

19   following testimony describing the evidentiary basis for each of these.

20

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[4] A.22-04-008 et seq., Administrative Law Judge's Ruling Outlining Phase 2 Issues and Schedule (October 31, 2023), p. 4 ("Parties are directed to concisely state, in their opening testimony and opening briefs, any proposed ordering paragraphs that they seek the Commission to issue in the second phase of this proceeding.").

[5] A.22-04-008 et seq., Administrative Law Judge's Ruling Outlining Phase 2 Issues and Schedule (October 31, 2023), p. 4 ("Parties shall also concisely state any specific findings and conclusions of law that would justify their proposed orders, as well as the basis in evidence for their proposed findings and conclusions of law.").

[6] *Tennessee Gas Pipeline Co. v. FERC* (D.C. Cir.) (1991) 926 F.2d 1206, 1208, citing to A. Lawrence Kolbe et al., *The Cost of Capital: Estimating the Rate of Return for Public Utilities* 13 (1984).

1	**II.**	**THE COMMISSION SHOULD FIND THAT THE PURPOSE OF COST OF**
2		**CAPTIAL PROCEEDINGS IS TO DETERMINE THE UTILITES' ACTUAL**
3		**COSTS OF CAPITAL, NOT TO DETERMINE AUTHORIZED RATES OF**
4		**RETURN BASED ON OTHER AUTHORIZED RATES OF RETURN THAT FAR**
5		**EXCEED UTILTIES' ACTUAL COSTS OF CAPITAL.**

6	**A.**	***Rate of Return on* Capital and *Cost of* Capital are not the same: Rate of**
7		**Return on Capital is a Financial Performance Metric; Cost of Capital is a**
8		**Measure of Economic Cost.**

9 **Q. What should be the goal of the Commission's cost of capital proceedings?**

10 A. A cost of capital proceeding authorizes the total rate of return on capital that utilities are

11 allowed to recover in customer rates. The goal of a cost of capital proceeding is to determine

12 the amount of each source of capital – common equity, preferred equity, and debt – and a

13 return on each that is as close as possible to the actual cost of each source of capital. The

14 common name of the proceedings in which authorized returns are determined, including in

15 California – *cost* of capital – reveals this intention that the financial return should match the

16 economic cost. The questions articulated in the Scoping Memo implicitly acknowledge this

17 goal, referring to the "cost" of various sources of capital.[7]

18

19 **Q. How does the rate of return on capital differ from the cost of capital?**

20 A. The rate of return on capital, often shortened to as "rate of return," is a measure of financial

21 performance, calculated by dividing the value *returned* to investors – e.g., interest, preferred

22 dividend, net income – by the amount of capital invested. The cost of capital is the return

23 investors *expect* on their investment.

24 It is referred to as a cost because it reflects what investors demand in return for assuming

25 the risk of the investment and, therefore, what companies must pay for that investment. The

26 *rate of return* on each form of capital, whether calculated retrospectively or estimated

27 prospectively, may or may not equal its respective *cost of capital*.

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[7] A.22-04-008 et seq., Assigned Commissioner's Ruling Consolidating Four Applications and Scoping
Memo and Ruling (July 12, 2022), p. 3.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1 **Q. Why is the distinction between the cost of capital and rate of return important?**

2 A. The cost of capital and rate of return (on capital) are entirely different concepts. The rate of

3   return is a financial performance metric. The cost of capital is an economic concept.

4   Nonetheless, they are frequently referred to interchangeably in utility regulatory proceedings,

5   perhaps in part because finance professionals commonly refer to the cost of capital as the

6   *expected* return (on capital).[8]

7   The muddling of the difference between the cost of capital and the rate of return is not

8   just of semantic concern, particularly when calculating the return on equity. Unlike

9   outstanding debt and preferred equity, whose costs of capital can be directly observed from

10   their respective market rates of return (interest and dividend, respectively), which in turn can

11   be used to accurately estimate the cost of any future issuances,[9] the cost of equity, both

12   existing and to-be-issued, cannot be directly observed and must be estimated using various

13   models.

14   This confusion between the *cost of* capital and the *return on* capital has infiltrated some

15   of the models commonly used in utility cost of capital proceedings to estimate the cost of

16   equity. Wide use of these models and apparent influence on regulatory decisions does not

17   render them correct, or mean they provide a suitable basis for estimating the cost of equity.

18   In Phase 1, all four Utilities used at least one model based on historical or forecast rates

19   of return, without reference to utilities' actual cost of equity: the Risk Premium (PG&E,[10]

20   SCE,[11] SDG&E,[12] SoCalGas[13]) and Expected Earnings (SDG&E,[14] SoCalGas[15]) models.

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[8] *See, e.g.,* Koller et al., *Valuation*, 5th ed. (2010), p. 35 ("The cost of capital is the price charged by investors for bearing the risk that the company's future cash flows may differ from what they anticipate when they make the investment. The cost of capital to a company equals the minimum return that investors expect to earn from investing in the company. That is why the terms *expected return to investors* and *cost of capital* are essentially the same. The cost of capital is also called the discount rate, because you discount future cash flows at this rate when calculating the present value of an investment, to reflect what you will have to pay investors.") (emphasis in original).

[9] As explained in Section V.B.1 below, though, despite the relative transparency of the cost of debt, SoCalGas's and SDG&E's authorized costs of debt have systematically exceeded their actual costs for many years.

[10] Exhibit PG&E-01 (Vilbert), p. 2-53.

[11] Exhibit SCE-02 (Villadsen), p. 49-53.

[12] Exhibit SDG&E-04 (Coyne), p. 42-45.

[13] Exhibit SCG-04 (Coyne), p. 42-45.

[14] Exhibit SDG&E-04 (Coyne), p. 45-47.

[15] Exhibit SCG-04 (Coyne), p. 45-47.

1   The Commission should reject outright the Risk Premium and Expected Earnings models.

2   The Risk Premium and Expected Earnings models incorporate no information about the

3   actual cost of equity and are therefore inherently flawed and produce invalid results. Only

4   models that estimate the *cost* of equity should be used to determine the authorized ROE.

5

6   **B.   Well-Established Legal and Regulatory Standards Establish That the**
7   **Commission Should Set ROR Equal to COC in Cost of Capital Proceedings.**

8 **Q. Please briefly describe the regulatory framework for setting the ROR equal to COC.**

9 A. The National Association of Regulatory Utility Commissioners (NARUC) explains:

10   For a utility, a fair rate of return must be provided to investors and must be
11   included in the revenue requirement in order to adequately cover the cost of
12   doing business in ratemaking and tariff-setting. Fundamental financial
13   concepts demonstrate that the fair rate of return to use in ratemaking for a
14   utility is its cost of capital in order to achieve the proper balance between
15   customers and investors. This overall fairness equation follows:

16

17   ROR = WACC

18

19   Where ROR = Rate of Return; and

20

21   WACC = Weighted Average Cost of Capital.[16]

22   FERC has similarly endorsed the ROR=COC standard:

23   There is compelling economic justification for relying on the market cost of
24   capital as the standard for rate of return decisions. Furthermore, a market cost
25   of capital approach addresses both the comparable earnings and attraction of
26   capital standards of the *Hope* decision.[17]

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[16] National Association of Regulatory Utility Commissioners, *Cost of Capital and Capital Markets: A Primer for Utility Regulators* (December 2019), p. 10, *available at* https://pubs.naruc.org/pub.cfm?id=CAD801A0-155D-0A36-316A-B9E8C935EE4D&_gl=1*znlz4w*_ga*MTY0NTQyMjE3NC4xNzA0ODM4MzYw*_ga_QLH1N3Q1NF*MTcwNTE4NDA4MC4zLjAuMTcwNTE4NDA4MC4wLjAuMA../.

[17] FERC Order No. 569, 169 FERC ¶ 61,129, p. 103 fn. 426 (citing *Generic Determination of Rate of Return on Common Equity for Public Utilities*, Order No. 489, FERC Stats. & Regs. ¶ 30,795 at 30,993, *reh'g denied*, Order No. 489-A, 42 FERC ¶ 61,390 (1988)).

1   The courts, too, recognize the economic principle that the "cost of capital is the minimum

2   rate of return necessary to attract capital to an investment."[18]

3

4   **Q. How can we be sure that setting ROR equal to COC will allow the utilities to attract**

5   **capital?**

6   A. If a utility can attract capital, it is operating successfully from a financial perspective. Let's

7   consider the two components of capital, debt and equity, separately.

8   With respect to attracting debt, as I will explain in more detail later in my testimony, the

9   ability to attract capital is largely a function of credit quality. It is long-standing and nearly

10   universal practice for utilities to request, and regulators to approve, capital structures and

11   rates of return that enable utilities to maintain high-quality credit ratings, "investment grade"

12   (S&P BBB/Moody's Baa) or better, precisely for the purpose of ensuring their ability to

13   attract debt capital. As long as utilities maintain investment grade credit ratings, it is

14   reasonable to assume they can attract debt capital.

15

16   **Q. What about equity? How can we be sure that setting the ROE equal to COE will allow**

17   **the utilities to attract capital?**

18   A. It's important to recognize that the cost of equity, and all other forms of capital, is

19   synonymous with the expected return on equity. As explained in the widely used finance text

20   *Valuation*, published by consulting firm McKinsey & Company:

21   The cost of capital is the price charged by investors for bearing the risk that
22   the company's future cash flows may differ from what they anticipate when
23   they make the investment. The cost of capital to a company equals the
24   minimum return that investors expect to earn from investing in the company.
25   That is why the terms *expected return to investors* and *cost of capital* are
26   essentially the same. The cost of capital is also called the discount rate,
27   because you discount future cash flows at this rate when calculating the
28   present value of an investment, to reflect what you will have to pay
29   investors."[19]

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[18] *Tennessee Gas Pipeline Co. v. FERC* (D.C. Cir.) (1991) 926 F.2d 1206, 1208 (citing to A. Lawrence
Kolbe et al., *The Cost of Capital: Estimating the Rate of Return for Public Utilities* 13 (1984)).
[19] Exhibit PCF-03, p. 10 (Koller et al., *Valuation*, 5th ed. (2010), p. 35 (emphasis in original)).

1   Prices in financial markets continuously adjust to reflect investors' current expectations of

2   future returns. By definition, then, the current price reflects the return required to attract

3   capital. Except in extreme cases, like bankruptcy, publicly traded companies like utilities can

4   *always* attract equity capital.[20]

5   As long as utilities maintain investment grade credit ratings and remain out of

6   bankruptcy, the investor interest in capital attraction requirement of "just and reasonable" is

7   satisfied. Setting ROE equal to COE satisfies the cost recovery requirement.

8

9   **Q. Is the ROR=COC standard recognized by cost of capital experts?**

10 A. Yes. Regulatory economists and cost of capital practitioners have recognized the ROR=COC

11   standard for decades.

12   MIT finance professor and Brattle Group colleague of PG&E and SCE witnesses Vilbert

13   and Villadsen, Stewart C. Myers articulated this standard as far back as 1972: "Regulation

14   should assure that the average expected rate of return on desired new investment is equal to

15   the utility's cost of capital."[21]

16   Economic consultants A. Lawrence Kolbe, James A. Read, Jr., and George R. Hall, at the

17   time with Charles River Associates, devoted a section of their 1984 book, *The Cost of*

18   *Capital: Estimating the Rate of Return for Public Utilities*, to explain why the rate of return

19   should be set equal to the cost of capital, on three grounds: law,[22] economics,[23] and

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[20] Even in bankruptcy, utilities are often able to raise equity. *See, e.g.,* Reuters, *PG&E raises $5.5 billion as it eyes exit from bankruptcy next week* (June 26, 2020), *available at* https://www.reuters.com/article/idUSKBN23X0WN/.

[21] Myers, *The Application of Finance Theory to Public Utility Rate Cases*, The Bell Journal of Economics and Management Science, Vol. 3, No. 1 (Spring, 1972), p. 80.

[22] Kolbe, Read, Hall, *The Cost of Capital: Estimating the Rate of Return for Public Utilities* (The MIT Press, 1984) (*"The Cost of Capital"*), p. 21-22 ("The United States Supreme Court has established that investors in companies subject to rate regulation must be allowed *an opportunity* to earn returns sufficient to attract capital and comparable to those they would expect in the unregulated sector for bearing the same degree of risk. The *Bluefield* and *Hope* cases provide the seminal decisions. … Since by definition, the cost of capital of a regulated firm represents precisely the expected return that investors could anticipate from other investments while bearing no more and no less risk, and since investors will not provide capital unless the investment is expected to yield its opportunity cost of capital, the correspondence of the definition of the cost of capital with the court's definition of legally required earnings appears clear. These two approaches are harmonized when the allowed rate of return is set equal to the cost of capital." (emphasis in original)).

[23] Kolbe et al., *The Cost of Capital*, p. 22 ("Direct and indirect economic benefits flow from setting the allowed rate of return for a regulated firm equal to the cost of capital. The direct benefits are that the

1   fairness.[24] Kolbe and Read are now colleagues of PG&E and SCE witnesses Villadsen and

2   Vilbert at The Brattle Group.[25]

3   In a 2015 paper titled, "A Half-Century of Computing the Cost of Capital for Utilities at

4   NERA," economic consulting firm NERA also endorsed the ROR=COC standard on fairness

5   grounds:

6   The regulatory compact in both countries [United States and Canada] is
7   shaped by judicial decisions and includes the right to earn a "fair return" on
8   investment, as determined by the opportunity cost of capital, …"[26]

9   Roger Morin's frequently cited *New Regulatory Finance* (2006) is more succinct: "The

10   regulator should set the allowed rate of return equal to the cost of capital so that the utility

11   can achieve the optimal rate of investment at the minimum price to the ratepayers."[27]

12   Reflecting the now widespread adoption of the ROR=COC standard, in recent years The

13   Brattle Group has been even more to the point: "All regulators reviewed determine an

14   authorised rate of return by estimating the cost of capital supplied by investors."[28]

15

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firm's customers will pay the lowest cost for service in the long run if the firm's investors expect the
allowed rate of return to equal the cost of capital. The indirect benefits are an assurance that society's
supply of capital will be used where it is most productive.").

[24] Exhibit PCF-05, p. 4 (Kolbe et al., *The Cost of Capital: Estimating the Rate of Return for Public
Utilities* at 24-25 ("[S]etting the allowed rate of return equal to the cost of capital satisfies the usual
notions of fairness. One underlying premise of cost-based regulation is that customers should pay the
cost of providing the service they get. … The cost of equity capital is precisely the foregone rate of
return on a comparably risky investment. Therefore, setting the allowed rate of return equal to this
cost is 'fair' to investors. Another premise of regulation is that customers should be protected from
the exercise of the monopoly power that may exist in in the industries that society chooses to regulate.
One undesirable consequence of monopoly power is the earning of excess returns on investment. But
'excess' returns must be defined with respect to some standard, and in economics this standard is the
rate of return that would be required on this investment in a competitive industry – the cost of capital.
… Setting the allowed rate of return equal to the cost of capital avoids excess returns and is 'fair' to
customers.").

[25] *See* https://www.brattle.com/experts/a-lawrence-kolbe/; https://www.brattle.com/experts/james-a-
read-jr/.

[26] Jeff D. Makholm, *A Half-Century of Computing the Cost of Capital for Utilities at NERA*, NERA
Economic Consulting (November 9, 2015), p. 10.

[27] Morin, *New Regulatory Finance* (2006), p. 23.

[28] The Brattle Group, *A Review of International Approaches to Regulated Rates of Return* (June 2020),
p. 1 *available at* https://www.brattle.com/insights-events/publications/a-review-of-international-
approaches-to-regulated-rates-of-return/).

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   **Q. What is your recommendation regarding the ROR=COC standard?**

2   A. I recommend the Commission formally adopt a standard that the authorized rate of return

3   should be set equal to utilities' cost of capital. As I will explain in more detail in Section IV

4   below, this would preclude the use of models based on authorized or forecast ROEs unless it

5   could be convincingly demonstrated that those ROEs accurately reflect utilities' actual cost

6   of equity.

7

8   **C.   Abundant, Robust Evidence Reveals that Authorized Rates of Return Far**
9   **Exceed the Utilities' Actual Costs of Capital.**

10   **Q. What evidence supports your testimony that authorized rates of return far exceed**

11   **Utilities' actual costs of capital both nationwide and in California?**

12   A. There is abundant evidence that utilities' authorized rates of return, nationwide and in

13   California, have far exceeded their actual cost of capital for decades. This evidence includes:

14   • Independent estimates of expected returns for the broad US equity market, which

15   provide an instructive benchmark for utilities' cost of equity;

16   • Utility market-to-book ratios, which provide direct, observable market feedback on

17   the relationship between authorized ROEs and utilities' cost of equity;

18   • Peer-reviewed academic research;

19   • Utilities own internal estimates of their cost of capital; and

20   • The decades-long upward spiral of utility rate base and customer rates in California.

21

22   **1.   Investment firms' expected return forecasts for the U.S. equity**
23   **market as a whole – which is riskier, on average, than utilities – are**
24   **consistently lower than utilities' authorized ROEs.**

25   **Q. What can be learned from the independent estimates of expected returns for the US**

26   **equity market?**

27   A. Expected returns on equity are estimated for purposes other than use in utility cost of capital

28   proceedings. Investment firms, such as JP Morgan, BlackRock, and T. Rowe Price, regularly

29   publish capital market assumption reports (CMAs) – expected return forecasts for various

30   assets classes. Figure 2 summarizes an update of the survey of US equity market return

1   forecasts included in my direct testimony.[29] This updated survey covers CMAs published by

2   34 investment firms in the first half of 2023.

3   The CMA forecasts shown in Figure 2 are long-term, with forecast horizons of 10 years

4   or more. The average expected long-term aggregate market return, 6.7%, is 30% lower than

5   the average ROE authorized for regulated utilities throughout the United States in the first

6   half of 2023, 9.6%.[30] The highest of 34 expected return forecasts, 8.3%, is a full 150 basis

7   points (1.5%) lower than the lowest authorized ROE among the California Utilities,

8   SoCalGas's 9.8%.[31]

9   **Figure 2. US equity market expected returns[32]**
10   Nominal, geometric

11

12
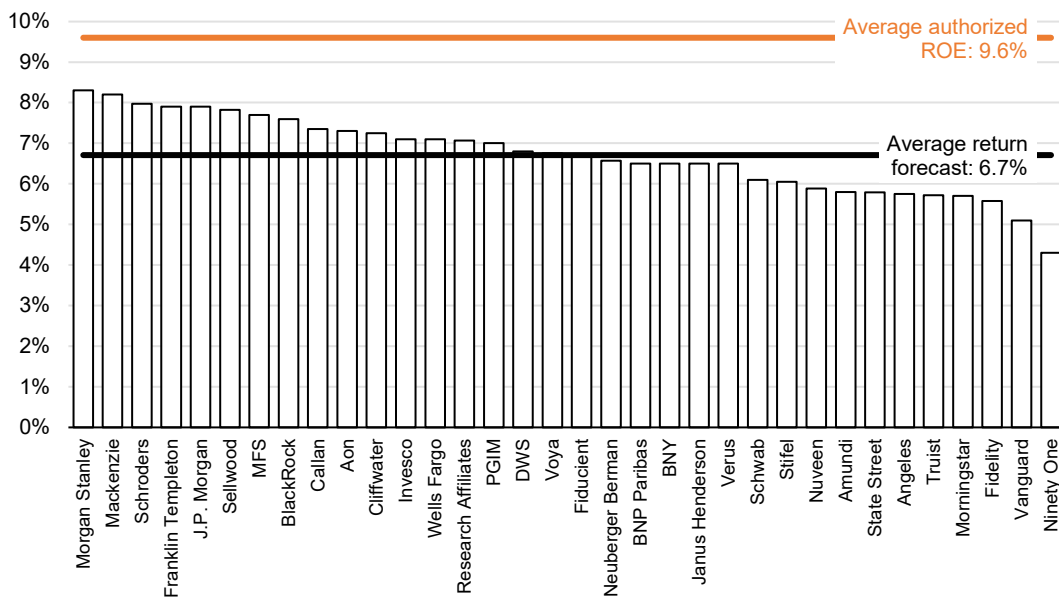
13   **Q. Why are third-party estimates of the expected return on the overall US equity market a**

14   **relevant benchmark for utilities cost of equity?**

15   A. As explained in the above quote from *Valuation*, "cost of capital" and "expected return" are

16   synonymous.

---

[29] Exhibit PCF-01 (Ellis), p. 13-15.

[30] M. Ellis analysis of S&P Global Market Intelligence (S&P GMI) data, *available at* https://www.spglobal.com/marketintelligence/en/ [last accessed Jan 21, 2024].

[31] D.11-12-0131 (Dec. 15, 2022), p. 1 *available at* https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M500/K015/500015851.PDF.

[32] M. Ellis analysis of investment firm CMA reports.

1   CMA equity return forecasts, i.e., cost of equity estimates, are a relevant and useful

2   benchmark for utility ROEs because US utilities are lower risk than the market as whole,

3   both historically and prospectively, due to their cost-plus regulatory model and relatively

4   stable long-term growth. For example, the popular personal finance website, The Motley

5   Fool, explains:[33]

6   Utility stocks typically make stable investments. Demand for utility services
7   such as electricity, natural gas, and water distribution tends to remain steady,
8   even during a recession. Meanwhile, the rates they charge for delivering these
9   services are either regulated (approved by a government entity) or
10   contractually guaranteed (non-regulated), so utilities generate reliable
11   earnings. That also allows them to pay dividends with above-average yields.
12
13   The combination of predictable profitability and income generation makes
14   utility stocks lower-risk options for investors because they're less volatile.

15   Investors therefore have *lower* expected returns than the market as a whole. That authorized

16   utility ROEs are so much higher than the expected returns on the higher-risk overall market

17   is a compelling indicator that authorized ROEs far exceed utility investors' expected returns,

18   i.e., utilities' actual cost of equity.

19

20   **2.   Utility market-to-book ratios reveal that utilities' cost of equity is**
21   **   substantially lower than authorized ROEs.**

22   **Q. What does a utility's market-to-book ratio tell us about the utility's rate of return?**

23   A. In my Phase 1 direct testimony, I explained the well-known relationship between a utility's

24   market-to-book ratio and its ROE, recognized by regulatory economists for at least 50

25   years.[34] An M/B ratio greater than 1.0 indicates a utility's expected ROE exceeds its COE.

26   Cost of capital expert Lawrence Kolbe, now with the Brattle Group, has referred to the M/B

27   ratio as a "guide for regulators."[35]

28

[33] Matthew DiLallo, *Investing in Top Utility Stocks*, The Motley Fool (Jan. 13, 2023)
     https://www.fool.com/investing/stock-market/market-sectors/utilities/ [as of January 24, 2024].
[34] Exhibit PCF-01 (Ellis), p. 16-18.
[35] Kolbe et al., *The Cost of Capital: Estimating the Rate of Return for Public Utilities* at 25.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1 Q. **Utility stock prices have fluctuated over the last few years. Do they still trade at an M/B**
2 **greater than 1.0?**
3 A. As seen in Figure 3, an update, through year-end 2023, of the historical utility sector average
4 M/B presented in my Phase 1 direct testimony,[36] the utility sector average M/B ratio has
5 hovered around 2.0 since 2012 and has been sustainably higher than 1.0 since 1991. As of the
6 end of 2023, the utility-sector average M/B was 1.9.[37] Just as legendary regulatory economist
7 Alfred Kahn observed in 1970, M/B ratios consistently above 1.0. indicates that utilities have
8 been "permitted to earn considerably more than their cost of capital" for decades.[38]

9 **Figure 3. Utility sector average market-to-book ratio[39]**
10 Year-end

11

12

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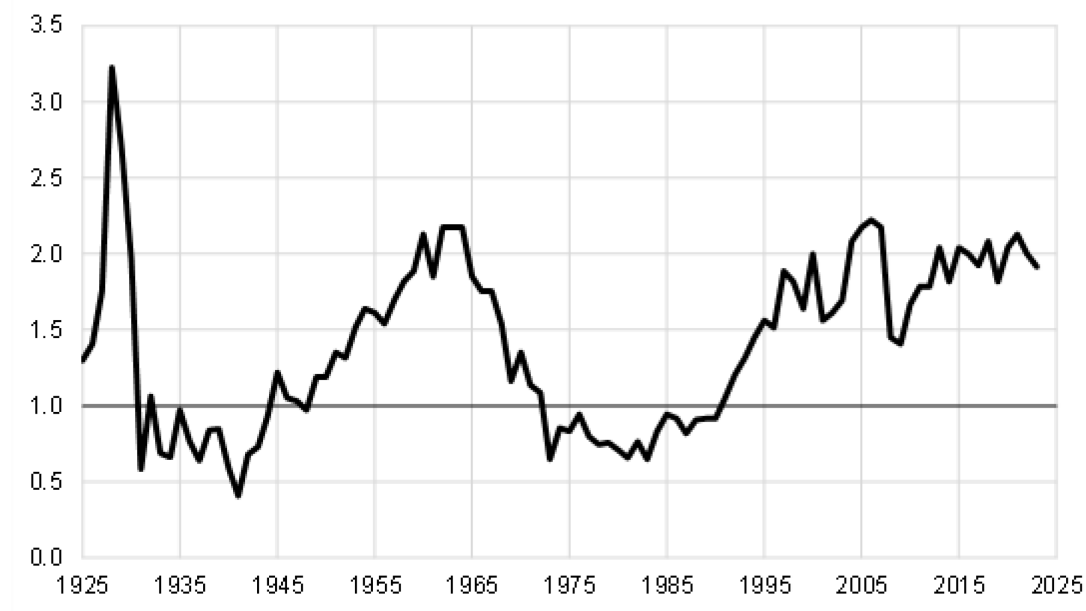
[36] Exhibit PCF-01 (Ellis), p. 17.
[37] S&P GMI data, *available at* https://www.spglobal.com/marketintelligence/en/ [last accessed Jan 21, 2024].
[38] Kahn, *The Economics of Regulation: Principles and Institutions* (1970), p. 48, fn. 69.
[39] M. Ellis analysis of French Data Library (FDL) data, *available at* https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html [last accessed Jan. 18, 2024] and S&P GMI data, *available at* https://www.spglobal.com/marketintelligence/en/ [last accessed Jan 21, 2024].

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   **Q. In practical, dollars-and-cents terms, what does it mean for a utility to have a market**

2   **value that is higher than its book value?**

3   A. In practical terms, this means that, for every dollar of equity a utility invests, shareholders

4   receive back not just their investment plus a reasonable return, which would be the case when

5   M/B = 1.0, but additional value equivalent to their equity investment multiplied by (M/B –

6   1.0). At current M/B ratios near 2.0, authorized ROEs effectively double the value of

7   utilities' equity investments, *in addition to* returning their cost of equity. Such high returns

8   are not necessary to attract capital and needlessly increase customer costs.

9

10   **a.   SDG&E witness Coyne Attributes, incorrectly, M/B ratios**
11   **greater than 1.0 to declining interest rates but nonetheless**
12   **concedes they reflect ROEs in excess of COE.**

13   **Q. Have utilities' cost of capital experts objected to using market-to-book ratios as a**

14   **"guide to regulators"?**

15   A. Yes, PG&E witness Villadsen and SCE witness Vilbert, in their book *Risk and Return for*

16   *Regulated Industries*, and widely-cited utility cost of capital expert Roger Morin, in his book

17   *New Regulatory Finance*, have attempted to refute the argument that utility market-to-book

18   ratios indicate ROEs exceed their costs of equity.

19

20   **Q. Please describe the flaws in SDG&E witness Coyne's argument.**

21   A. In his rebuttal testimony, witness Coyne attempts to explain utility M/B ratios greater than

22   1.0 by presenting a regression analysis of historical utility sector average M/B ratios against

23   Treasury yields.[40] The analysis demonstrates that utility M/B ratios are sensitive to interest

24   rates, which is expected, because interest rates influence the cost of equity. The analysis also

25   demonstrates that ROEs have not declined in line with the decline in interest rates over the

26   last several decades, which is precisely the argument made by those who point to high M/B

27   ratios as evidence that ROEs exceed COEs. Witness Coyne's regression analysis does not

28   incorporate either ROEs or COEs, though, and therefore does not, and can not, tell us

29   anything about the relationship between ROE and COE.

---

[40] Exhibit SDG&E-08 (Coyne), p. 21-22.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   Under cross-examination, witness Coyne agreed that (1) ROE is the return on book

2   equity value; (2) M/B greater than 1.0 means investors pay more than book value to purchase

3   utility stocks (i.e., equity); (3) paying more for the same stream of cash flows necessarily

4   results in a lower expected return (i.e., COE). The necessary implication of these statements

5   is that utility M/B ratios greater than 1.0 reflect ROEs greater than COE.

6

7   **b.   PG&E and SCE witness Villadsen and Vilbert incorrectly**
8   **interpret research on irrational "human traits" in their**
9   **attempt to explain elevated M/B ratios.**

10

11   **Q. Please describe the flaws in the argument made by witnesses Villadsen and Vilbert?**

12   A. In *Risk and Return for Regulated Industries*, witnesses Villadsen and Vilbert, and the very

13   same Kolbe who previously advocated the use of M/B as a "guide to regulators," refer to

14   Nobel laureate Robert Shiller's prize lecture to argue that market prices do not necessarily

15   reflect investors' expected returns, and therefore M/B ratios greater than 1.0 do not indicate

16   that a utility is expected to earn more than its cost of capital:

17   [W]e now know that the market-to-book ratio does *not* signal reliably whether
18   a utility earns more or less than its cost of capital.
19   …
20   Professor Shiller holds instead that market prices are materially affected by
21   human traits that are not always in accord with pure economic rationality.
22   Among other things, Professor Shiller has shown that the standard present
23   value formula does not explain stock prices, which are too volatile for that
24   model to hold true. If stock prices are nonetheless rationally priced, it is in
25   accord with a formula that we do not yet know.[41]

26   Yet in that very same address Shiller points out that his research on "human traits" and

27   "economic rationality" applies only to the market overall, not to individual stocks:

28   These conclusions about the aggregate stock market, however, do not carry
29   over fully to individual stocks. [Nobel laureate] Paul Samuelson has asserted
30   that:

31

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[41] Villadsen, Vilbert, Harris, Kolbe, *Risk and Return for Regulated Industries* (Elsevier, 2017), p. 295-296 (emphasis in original).

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   [The market is] micro efficient but macro inefficient. That is, individual stock
2   price variations are dominated by actual new information about subsequent
3   dividends, but aggregate stock market variations are dominated by bubbles.
4   …
5   Thus, bubbles and their bursts cannot have more than a minor impact on the
6   returns of individual stocks, and most of the variation in their returns comes
7   from news about the future payouts the firms will make.[42]

8   Shiller goes on to specifically explain that "ratios" like M/B "reflect real knowledge about

9   future cash flows" and are therefore "useful approximation of reality for individual firms":

10   In individual firms there is sometimes a lot of action in the ratios, and the
11   action in fact often reflects real knowledge about future cash flows. That is an
12   example of the kind of idiosyncratic knowledge about individual firms that
13   makes the efficient markets model a useful approximation of reality for
14   individual firms.[43]

15   Villadsen et al. misinterpret Shiller's research by applying his findings about the

16   aggregate market to individual stocks, which Shiller expressly warns against. Shiller

17   establishes that the market-to-book ratio reveals important information about the value of

18   individual stocks like utilities, and does, in fact, "signal reliably whether a utility earns more

19   or less than its cost of capital."

20

21   c.   **Widely cited utility cost of capital expert Roger Morin's**
22   **various reasons why utility M/B ratios greater than 1.0 do not**
23   **indicate ROE greater than COE are all deeply flawed.**

24   **Q. Does Morin acknowledge the relationship between M/B ratio and ROE?**

25   A. Yes. Morin acknowledges the fundamental relationship between market-to-book ratio and

26   ROE:

27   [I]f regulators set the allowed rate of return equal to the cost of capital, the
28   utility's earnings will be just sufficient to cover the claims of the bondholders
29   and shareholders. No wealth transfer between ratepayers and shareholders will
30   occur.

---

[42] Shiller, *Speculative Asset Prices* (2013), p. 476 *available at*
https://www.nobelprize.org/uploads/2018/06/shiller-lecture.pdf.
[43] Shiller, *Speculative Asset Prices* (2013), p. 478 *available at*
https://www.nobelprize.org/uploads/2018/06/shiller-lecture.pdf.

1   The direct financial consequence of setting the allowed return on equity, r,
2   equal to the cost of equity capital, K, is that share price is driven toward book
3   value per share, at least in theory under ideal conditions. Intuitively, if r > K,
4   and is expected to remain so, then market price will exceed book value per
5   share since shareholders are obtaining a return [on book equity] in excess of
6   their opportunity cost.[44]

7   Nonetheless, Morin advises regulators *not* to look at the M/B ratio for guidance in

8   determining whether ROE exceeds the cost of equity:

9   It is sometimes argued that because current M/B ratios are in excess of 1.0,
10   this indicates that companies are expected by investors to be able to earn more
11   than their cost of capital, and that the regulating authority should lower the
12   authorized return on equity, so that the stock price will decline to book value.
13   It is therefore plausible, under this argument, that stock prices drop from the
14   current M/B value to the desired M/B range of 1.0 times book.
15
16   There are several reasons why this view of the role of M/B ratios in regulation
17   should be avoided.[45]

18   Morin provides four reasons to ignore M/B ratios in assessing ROEs. All four are flawed;

19   some lack any reasonable foundation.

20

21   **Q. What are the flaws in Morin's four reasons not to use M/B as an indicator of the**

22   **relationship between ROE and COE.**

23   A. Morin's first reason, that setting the ROE such that M/B equals 1.0 *requires* investors to be

24   irrational, is flawed because it rests on an unrealistic assumption. He *assumes* that investors

25   expect the M/B to be higher but nonetheless invest in the knowledge that the M/B will be 1.0.

26   This is not a realistic assumption about investor behavior.

27   Morin's second reason is flawed because it does not actually provide any reason to reject

28   the M/B=1.0 standard. It merely restates the basic relationship between M/B, ROE, and COE.

29   Morin's third reason is flawed because it assumes (1) regulators must allow utilities to

30   over-earn in future periods to compensate for any past under-earning; and (2) that M/B ratio

31   is what determines a company's ability to attract capital. Neither of these assumptions is true.

---

[44] Morin, *New Regulatory Finance* at 359.
[45] Morin, *New Regulatory Finance* at 376.

1   Morin's fourth reason is flawed because it assumes a non-existent regulator standard: that

2   regulators are required to set returns such that utilities' market values equal replacement cost,

3   but M/B=1.0 standard would limit utilities' market value only to book value.

4

5 **Q. Please describe the flaw in Morin's first reason for his claim that regulators should**

6   **avoid using M/B ratios as a guide in setting authorized ROEs.**

7 A. The flaw in Morin's first reason is that it rests on an unrealistic assumption. He assumes

8   investors would invest expecting the M/B to be higher than 1.0 even in the full knowledge

9   that the regulator intends to set the ROE such that M/B will be 1.0. This is not a realistic

10   assumption about investor behavior.

11   Morin maintains that setting the ROE such that M/B equals 1.0 *requires* investors to be

12   irrational, investing with full knowledge they will incur a loss:

13   The view that regulation should set an allowed rate of return so as to produce
14   an M/B of 1.0 *presumes that investors are irrational*. They commit capital to
15   a utility with an M/B in excess of 1.0, knowing full well that they will be
16   inflicted a capital loss by regulators. For example, assume a utility company
17   with an M/B ratio of 1.5. If investors expect the regulator to authorize a return
18   on book value equal to the DCF cost of equity, the utility stock price would
19   decline to book value, inflicting a capital loss of some 30%. The notion that
20   investors are willing to pay a price of 1.5 times book value only to see the
21   market value their investment drop by 30% is irrational.[46]

22   This argument begs the question – or assumes what must be proven. Morin's unstated

23   assumption is that investors are willing to pay 1.5 times book value for the utility's shares

24   *with full knowledge that regulators will reduce the authorized ROE to the COE*. The only

25   reason investors would be willing to pay 1.5 times book value, though, is precisely because

26   they *do not* "expect the regulator to authorize a return on book value equal to the DCF cost of

27   equity." If they did expect regulators to reduce the ROE to the COE, the M/B ratio would not

28   be 1.5 but much closer to 1.0, as Morin suggests ("the utility stock price would decline to

29   book value, inflicting a capital loss of some 30%"). Morin's hypothetical – "assume a utility

30   company with an M/B ratio of 1.5" – is accepted as "rational" only because regulators in

---

[46] Morin, *New Regulatory Finance* at 376 (emphasis added).

1   nearly every state have a decades-long track record of authorizing ROEs far in excess of

2   actual COEs and, so far, have given no indication that they will not continue to do so.

3   **Q. Please describe the flaw in Morin's second reason for his claim that regulators should**

4   **avoid using M/B ratios as a guide in setting authorized ROEs.**

5   A. Morin's second reason is flawed because it does not actually provide any reason to reject the

6   M/B=1.0 standard. It merely restates the basic relationship between M/B, ROE, and COE:

7   The condition that the M/B ratio will gravitate toward 1.0 if regulators set the
8   allowed return equal to capital costs will be met only if the actual return
9   expected to be earned by investors is at least equal to the cost of capital on a
10   consistent long-term basis and absent inflation. The cost of capital of a
11   company refers to the expected long-run earnings level of other firms with
12   similar risk. If investors expect a utility to earn an ROE equal to its cost of
13   equity in each period, then its M/B ratio would be approximately 1.0 or higher
14   …[47]

15   Morin provides no reason in this passage for regulators not to set the COE such that the M/B

16   equals 1.0.

17   It should be noted that Morin's qualification regarding inflation is not warranted.

18   Expected inflation is reflected in the cost of both debt and equity capital. For example,

19   interest rates rose in 2022 and 2023 as actual and expected inflation increased. To the extent

20   ROE is based on the actual cost of equity, it will necessarily incorporate expected inflation.

21   There is no need for the economy to be "absent inflation" for the basic relationship between

22   M/B ratio, ROE, and COE to hold.

23

24   **Q. Please describe the flaw in Morin's third reason for his claim that regulators should**

25   **avoid using M/B ratios as a guide in setting authorized ROEs.**

26   A. Morin's third reason is flawed because it assumes (1) regulators must allow utilities to over-

27   earn in future periods to compensate for any past under-earning; and (2) that M/B ratio is

28   what determines a company's ability to attract capital. Neither of these assumptions is true.

29   Morin's third reason entails several different arguments.

30   Morin's first argument is that M/B ratios greater than 1.0 are necessary because

31   regulators must compensate utilities for periods when their M/B ratios were less than 1.0:

---

[47] Morin, *New Regulatory Finance* at 376.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1	The achievement of a 1.0 M/B ratio is appropriate, but only in a long-run
2	sense. For utilities to exhibit a long-run M/B ratio of 1.0, it is clear that during
3	economic upturns and more favorable capital market conditions, the M/B ratio
4	must exceed its long-run average of 1.0 to compensate for the periods during
5	which the M/B ratio is less than its long-run average under less favorable
6	economic and capital market conditions.
7	
8	Historically, the M/B ratio for utilities has fluctuated above and below 1.0. It
9	has been consistently above 1.0 from the 1980s to the mid-2000s [and since
10	then, as well]. This indicates that earnings below capital costs and M/B ratios
11	below 1.0 during less favorable economic and capital market conditions *must*
12	*necessarily* be accompanied with earnings in excess of capital costs and M/B
13	ratios above 1.00 during more favorable economic and capital market
14	conditions.[48]

15 Going back to 1925, the average M/B ratio for utilities has been 1.4; regardless of the

16 calculation starting point, the historical average has never been lower than 1.36 (from 1931

17 through 2023).[49] Mathematically, ROEs could be set at a level to keep M/B ratios at 1.0 into

18 perpetuity without the average dropping below 1.0. The facts flatly contradict Morin's claim

19 that "[f]or utilities to exhibit a long-run M/B ratio of 1.0, it is clear that during economic

20 upturns and more favorable capital market conditions, the M/B ratio must exceed its long-run

21 average of 1.0 to compensate for the periods during which the M/B ratio is less than its long-

22 run average under less favorable economic and capital market conditions."

23 More importantly, contrary to Morin's above assertion that "earnings below capital costs

24 and M/B ratios below 1.0 during less favorable economic and capital market conditions *must*

25 *necessarily* be accompanied with earnings in excess of capital costs and M/B ratios above

26 1.00 during more favorable economic and capital market conditions," there is no regulatory

27 principle requiring rates to be set so as to compensate current and future shareholders for past

28 earnings shortfalls, especially shortfalls that were last experienced by shareholders in the

29 1980s. Morin has fabricated this argument out of whole cloth.

30 Morin's third reason includes a second argument, that an M/B less than 1.0 would

31 prohibit a utility from attracting capital:

---

[48] Morin, *New Regulatory Finance*, p. 377 (emphasis added).
[49] M. Ellis analysis of FDL data, *available at*
https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html [last accessed Jan. 18, 2024].

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1	M/B ratios are determined in the marketplace, and utilities cannot be expected
2	to compete for and attract capital in an environment where industrials [and
3	other industries] are commanding M/B ratios well in excess of 1.0 while
4	regulation reduces their M/B ratios toward 1.0. Moreover, if regulators were
5	to currently set rates so as to produce an M/B of 1.0, not only would the long-
6	run target M/B ratio of 1.0 be violated, but more importantly, the inevitable
7	consequence would be to inflict severe capital losses on shareholders.
8	Investors have not committed capital to utilities with the expectation of
9	incurring capital losses from a misguided regulatory process.[50]

10   The implication of Morin's claim that "utilities cannot be expected to compete for and

11   attract capital in an environment where industrials [and other companies] are commanding

12   M/B ratios well in excess of 1.0 while regulation reduces [utilities'] M/B ratios toward 1.0"

13   is that investors will invest only in the companies with the highest M/B ratios. A moment's

14   reflection reveals this simply cannot be true. Investors buy the shares of companies spanning

15   a range of M/B ratios, including those with M/B ratios less than 1.0, like General Motors,

16   with an M/B ratio of 0.64 as of January 19, 2024.[51] And, as just explained above, rates could

17   be set "so as to produce an M/B of 1.0" into perpetuity without "violating" Morin's fictitious

18   regulatory "long-run target M/B ratio of 1.0."

19   Morin acknowledges that even *utilities* with M/B ratios less than 1.0 can "compete for

20   and attract capital in an environment where industrials [and other industries] are commanding

21   M/B ratios well in excess of 1.0":

22	The above example [illustrating the adverse consequences for existing
23	shareholders of selling stock below book value] does not imply that utilities
24	cannot, in fact, raise capital when share prices are below book value, but that
25	they can only do so at the expense of existing shareholders.[52]

26   It is important to recognize that *Hope* established that regulators are not obligated to

27   maintain utility stock market valuations, and that such an obligation would make a nonsense

28   of regulators' consumer protection mandate:

---

[50] Morin, *New Regulatory Finance*, p. 377 (emphasis added).
[51] Yahoo! Finance, https://finance.yahoo.com/quote/GM/key-statistics?p=GM [last accessed Jan. 19, 2024].
[52] Morin, *New Regulatory Finance*, p. 364.

		Ratemaking is indeed but one species of price-fixing. The fixing of prices, like
1		
2		other applications of the police power, may reduce the value of the property
3		which is being regulated. *But the fact that the value is reduced does not mean*
4		*that the regulation is invalid.* It does, however, indicate that "fair value" is the
5		end product of the process of ratemaking, not the starting point, as the Circuit
6		Court of Appeals held. The heart of the matter is that rates cannot be made to
7		depend upon "fair value" when the value of the going enterprise depends on
8		earnings under whatever rates may be anticipated.[53]

9   The impact on existing shareholders of reducing ROEs to a level that brings M/B ratios to

10   the *Hope* and NARUC standard of 1.0 should not factor at all into regulators' determination

11   of the appropriate rate of return.

12

13   **Q. Please describe the flaw in Morin's fourth reason for his claim that regulators should**

14   **avoid using M/B ratios as a guide in setting authorized ROEs.**

15   A. Morin's fourth reason is that the M/B=1.0 would set utilities' market value equal to book

16   value, but regulators are required to set returns such that utilities' market values equal

17   replacement cost. This reason is flawed because there is no such regulatory standard.

18   Morin asserts that regulators must set the rate of return such that the value of the utility is

19   equal to the replacement cost of its assets:

20   Rate of return regulation is fundamentally a surrogate for competition. The
21   fundamental goal of regulation should be to set the expected economic profit
22   for a public utility equal to the level of profits expected to be earned by firms
23   of comparable risk, in short, to emulate the competitive result. For unregulated
24   firms, the natural forces of competition will ensure that in the long run, the
25   ratio of the market value of these firms' securities equals the replacement cost
26   of their assets. Competitive industrials of comparable risk to utilities have
27   consistently been able to maintain the real value of their assets in excess of
28   book value, consistent with the notion that, under competition, the Q-ratio will
29   tend to 1.00 and not the M/B ratio. This suggests that a fair and reasonable
30   price for a public utility's common stock is one that produces equality
31   between the market price of its common equity and the replacement cost of its
32   physical assets. The latter circumstance will not necessarily occur when the
33   M/B ratio is 1.0.[54]

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[53] *Fed. Power Comm'n v. Hope Nat. Gas Co.* (1944) 320 U.S. 591, 60 (emphasis added).
[54] Morin, *New Regulatory Finance*, p. 377 (emphasis added).

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   Morin is correct that "[r]ate of return regulation is fundamentally a surrogate for

2   competition." But the "competitive result" is different for utilities than for competitive

3   industrials. As Kahn observed, "returns in industry generally contain some monopoly

4   component" and the risk profiles of nonregulated industries are not comparable to utilities.[55]

5   In addition:

6   [I]f utility stocks are compared with those of non-utility corporations …,
7   utilities which are protected from many forms of competition will be
8   compared with the winners in other areas with no such … protection.
9   Somehow, in strict logic, the shadow losses of long defunct automobile
10   companies would have to be subtracted from the profits of General Motors,
11   after these in turn had been adjusted downward for the hypothetical
12   competition.[56]

13   This is why neither Morin nor any other cost of capital expert uses or even evaluates Q-

14   ratios in their cost of capital analyses. Morin's invocation of the Q-ratio is a rhetorical red

15   herring; it has no relevance whatsoever to a utility's cost of capital. Rather, as Kahn observed

16   more than 50 years ago, for utilities the competitive result is revealed by an M/B ratio of 1.0.

17   A simple thought experiment reveals why. It is a basic financial truism that paying more

18   for a given stream of cash flows entails a lower return. For example, if I pay $100 for an

19   asset that returns $5 per year for 20 years plus my initial $100 investment at the end of year

20   20, my rate of return will be 5%. If I pay $150 for the same stream of cash flows (including

21   the return of only $100 in year 20), my rate of return is reduced to 2%.

22   Similarly, when investors buy a utility stock earning a 10% ROE at more than book

23   value, their expected return, i.e., their cost of equity, *must* be less than 10%. The

24   "competitive result" is the lower return that investors are willing to accept. By itself, the M/B

25   ratio cannot reveal that required rate of return. But it can tell us if the authorized ROE is

26   higher or lower than the required return, the cost of equity; an M/B ratio of 1.0 tells us that

27   the authorized ROE is equal to the COE, i.e., the "competitive result" in the market for

28   capital investment.

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[55] Kahn, *The Economics of Regulation: Principles and* Institutions, p. 52-53.
[56] Kahn, *The Economics of Regulation: Principles and Institutions,* p. 53, fn. 81 (citing William G. Shepherd & Thomas G. Gies, *Utility Regulation New Directions in Theory and Policy* (1966), p. 35-45).

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1

Q. What is your conclusion regarding these arguments against the reliability of the utilities' M/B ratios as an indicator of their ROEs?

A The concept of net present value upon which the M/B=1.0 standard is based is first among the "seven most important ideas in finance" identified in the popular textbook *Principles of Corporate Finance*.[57] I find it surprising that any financial professional would argue that utility M/B ratios do *not* provide insight into ROEs.

3.   Peer-reviewed academic research concludes authorized ROEs far exceed utilities actual cost of equity.

Q. Have any independent researchers examined the relationship between utilities' cost of equity and authorized ROEs?

A. Yes. At least two different research groups have investigated the relationship between utilities' cost of equity and authorized ROEs in the U.S. In a study published in 2019 exploring potential explanations, cited in my Phase 1 direct testimony,[58] Carnegie Mellon researchers David Rode and Paul Fischbeck concluded:

> It would appear that regulators are authorizing excessive returns on equity to utility investors and that these excess returns translate into tangible profits for utility firms.
> …
> In the end, we may observe simply that what regulators *should* do, what regulators *say* they're doing, and what regulators *actually* do may be three very different things.[59]

Although not independent, SCE witness Villadsen has nonetheless also alluded to this regulatory say-do gap, noting, "[A]ll regulators *(say that they)* set the allowed return equal to the estimated cost of capital."[60]

    In 2022, University of California, Berkeley researchers Karl Dunkle Werner and Stephen Jarvis similarly observed:

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[57] Brealey, Myers, Allen, *Principles of Corporate Finance*, 10th edition (2011), p. 866.
[58] Exhibit PCF-01 (Ellis), p. 19-20.
[59] Rode, Fishchbeck, *Regulated equity returns: A puzzle*, Energy Policy 133 (2019), p. 1, 16 (emphasis in original).
[60] Brown, *Villadsen, International Approaches to Regulated Rates of Return: A Review*, The Brattle Group (Sep. 16, 2020) p. 17 (emphasis added).

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   The gap between the approved return on equity and other measures of the cost
2   of capital have [*sic*] increased substantially over time.
3   …
4   Our analysis shows that the RoE that utilities are allowed to earn has changed
5   dramatically relative to various financial benchmarks in the economy. We
6   estimate that the current approved average return on equity is substantially
7   higher than various benchmarks and historical relationships would suggest.[61]

8   **4.   Utilities' own internal estimates of their cost of equity are significantly**
9   **lower than the ROEs they request and the ROEs the Commission**
10   **approves.**

11   **Q. Have the Utilities ever disclosed their internal assessments of their own cost of equity?**

12   A. Yes. As explained in my Phase 1 rebuttal testimony, for each of the 4 years from 2016 to

13   2019, Sempra disclosed its internal estimate of its company-wide cost of equity in its SEC-

14   filed annual proxy statement.[62] Over that period, Sempra's internally estimated COE was no

15   higher than approximately 4%, substantially lower than the ROEs SDG&E and SoCalGas

16   requested over the same timeframe. Sempra's overall risk profile was greater than the

17   Sempra Utilities', so there was no economic reason the Sempra Utilities' COE would have

18   been higher than Sempra's.

19

20   **Q. What do you conclude from your findings regarding Sempra's internal estimates of its**

21   **cost of equity?**

22   A. Sempra executives maintained two inconsistent sets of cost of equity estimates. For the

23   purposes of determining their compensation, where a low value would serve their personal

24   financial interests, the estimated cost of equity was low. For the purposes of the

25   Commission's cost of capital proceedings, where a high value would serve their personal

26   financial interests, the estimated cost of equity was more than 2.5 times as high.

27

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[61] *See, e.g.*, Karl Dunkle Werner and Stephen Jarvis, *Rate of Return Regulation Revisited*, Energy
Institute at Haas Working Paper 329 (2022), p. 14, 34-35, *available at* https://haas.berkeley.edu/wp-content/uploads/WP329.pdf.
[62] Exhibit PCF-02 (Ellis), p. 7-10.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

<table>
<tr><td>1</td><td colspan="2">5. Excess ROEs create a cycle of upward spiraling growth in rate base</td></tr>
<tr><td>2</td><td></td><td>and customer rates.</td></tr>
</table>

1
2 **5. Excess ROEs create a cycle of upward spiraling growth in rate base and customer rates.**

3 **Q. Why is the gap between authorized ROE and the cost of equity so important?**

4 A. As explained in my Phase 1 direct testimony, the gap between authorized ROE and the cost

5 of equity has set in motion a cycle of upward spiraling growth in rate base and customer

6 rates, particularly in California.[63] The California Utilities' electric rates have been higher

7 than the national average for many years, but in the last decade the difference between the

8 California Utilities and the rest of the country has widened considerably. As shown in Figure

9 4, an update of an analysis contained in my direct testimony, the percentage gap between

10 each of the California Utilities' average residential electric rate and the national average

11 (with the national average rate equal to 0%) continues to widen. While the California

12 Utilities' residential electric rate premia ranged between 23% and 50% above the national

13 average from 1990-2010, since then, the rate premia have ballooned to 89%-190% – nearly

14 double to triple the national average.

15 Since 2010, the California Utilities' residential electricity rates have grown at 2-3 times

16 the rate of inflation, while the average US residential electricity rate has declined by 1% in

17 real terms.[64] In just the four years since the last cost of capital proceeding, from 2019 to

18 2023, PG&E's, SCE's and SDG&E's residential rates have increased by 52%, 86%, and

19 80%, respectively, compared to 23% for the industry overall and 19% for inflation.

---

[63] Exhibit PCF-01 (Ellis), p. 21-25.

[64] From 2010 through 2023, cumulative inflation was 40%. PG&E's, SCE's, and SDG&E's residential rates increased 117%, 113%, and 169%, respectively. The US average increased 39%. M. Ellis analysis of Energy Information Administration (EIA) data, *available at* https://www.eia.gov/electricity/data/eia861m/ [last accessed January 24, 2024]; Bureau of Labor Statistics (BLS) data, *available at* https://www.bls.gov/cpi/data.htm [last accessed January 24, 2024].

1 **Figure 4. Premium of California Utilities' residential electric rate over US average**[65]
2 Percent
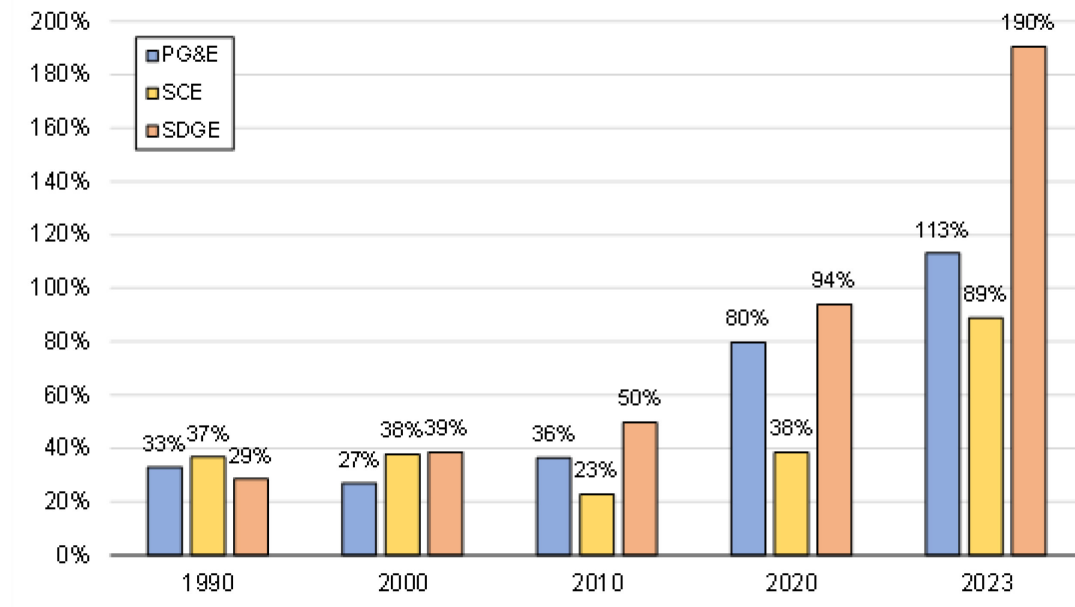
5 **Q. Please explain the dynamics of how excess authorized ROEs result in upward spiraling**
6 **growth in rate base and customer rates.**

7 A. As explained in my Phase 1 direct testimony, the executive management teams of the

8 California Utilities, like the leadership of all publicly traded companies, seek to maximize

9 shareholder value.[66] The primary driver of the value of a utility stock is its expected future

10 earnings. Earnings, in turn, are directly linked to the authorized ROE. So the most

11 straightforward way to sustain or increase a utility's stock price is to sustain or increase its

12 ROE.

13 But the relationship between ROE and stock value is not linear, i.e., a 10% increase in

14 ROE, from, say 10% to 11%, does not result in an increase in the stock price of 10%, but of

15 12% to 20%.[67] So utility executives face strong incentives to keep ROEs as high as possible.

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[65] 2023 for January through October. M. Ellis analysis of EIA data, *available at*
https://www.eia.gov/electricity/data/eia861m/ [last accessed January 24, 2024].
[66] Exhibit PCF-01 (Ellis), p. 23-24.
[67] Based on a sustainable growth DCF model, $P = B \times (ROE - g) / (COE - g)$ with COE = 6.0% and g = 2%-5%.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   The other key lever to boost utility stock prices is investment in new capital projects. As
2   explained above, with M/B ratios of roughly 2.0, every dollar of equity invested creates two
3   dollars of shareholder value.

4

5 Q. **Do utility executive compensation plans contribute to this problem?**
6 A. Yes. As explained in my Phase 1 direct and rebuttal testimony, a significant share of utility
7   executive compensation is tied to sustaining a high ROE and rate base growth – directly
8   through the earnings component of their annual performance-related bonuses, or indirectly
9   through their annual stock grants.[68] For example, based on an updated analysis of Sempra's
10   2022 executive compensation plans, the overall share of SDG&E and SoCalGas officers'
11   annual compensation that is tied to ROE and rate base growth ranges from approximately
12   40% to nearly 60%. For Sempra corporate officers, the range is approximately 65%-85%.[69]

13

14 Q. **How have these dynamics played out, in terms of growth in rate base and customer**
15   **rates?**
16 A. Figure 5 is an update, through 2022, of an analysis presented in my Phase 1 direct testimony
17   illustrating how these dynamics have played out for SDG&E and SoCalGas.[70] Since 2000,
18   while SDG&E's and SoCalGas's total deliveries of electricity and natural gas have declined
19   by 30% and 21%, their rate bases have grown by factors of 6.1x and 4.5x, respectively (3.6x
20   and 2.7x after adjusting for inflation). Net income has grown nearly in lockstep. On a per-
21   unit-delivered basis, SDG&E's and SoCalGas's rate bases have grown by 8.6 and 5.7 times
22   (5.1x and 3.4x after adjusting for inflation).
23   These figures reflect a capital inefficiency that is likely unmatched by any other industry
24   in the economy. High ROEs create the powerful incentives – directly through their impact on
25   earnings and indirectly through their non-linear effect on the stock price – that contribute to
26   the rapid escalation of the California Utilities' costs and rates over the past two decades.

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[68] Exhibit PCF-01 (Ellis), p. 23-24; Exhibit PCF-02 (Ellis), p. 7-10.
[69] M. Ellis' analysis of Sempra 2023 Notice of Annual Shareholders Meeting and Proxy Statement,
SoCalGas 2023 Notice of Annual Shareholders Meeting, and SDG&E 2022 and 2021 Wildfire Safety
Division (WSD) executive compensation compliance letters and WSD approval letters.
[70] Exhibit PCF-01 (Ellis), p. 23-25.

1   High ROEs create the powerful incentives – directly through their impact on earnings and

2   indirectly through their non-linear effect on the stock price – that have contributed to the

3   rapid escalation of SDG&E and SoCalGas's costs and rates over the past two decades.

1
2

Figure 5. Growth in SDG&E and SoCalGas operating and financial metrics[71]
2021 value expressed as a multiple of 2000 value

Metric	SDG&E		SoCalGas	
	Nominal	Real	Nominal	Real
Deliveries[72]	**0.70**		**0.79**	
Electricity	0.92			
Natural gas	0.60		0.79	
Revenue	2.19	1.29	2.40	1.41
Electricity	2.20	1.29		
Natural gas	2.14	1.26	2.40	1.41
Revenue less purchased energy	4.18	2.46	3.09	1.82
Less purchased fuel/power	4.43	2.61		
Less purchased gas	3.18	1.87	3.09	1.82
Rate base	**6.09**	**3.58**	**4.51**	**2.65**
Net income[73]	6.06	3.57	2.90	1.71
Capital cost[74]				
Excluding tax	5.46	3.21	3.21	1.89
Including tax	4.51	2.66	2.69	1.58
Per unit delivered				
Revenue	3.10	1.83	3.05	1.80
Electric	2.40	1.41		
Gas	3.54	2.09	3.05	1.80
Revenue less purchased energy	5.93	3.49	3.93	2.31
Less purchased fuel/power	4.84	2.85		
Less purchased gas	5.26	3.09	3.93	2.31
Rate base	**8.64**	**5.09**	**5.74**	**3.38**
Net income	8.60	5.06	3.69	2.17
Capital cost				
Excluding tax	7.75	4.56	4.09	2.41
Including tax	6.40	3.77	3.42	2.01
Average electric rate				
Residential	3.32	1.95		
US residential	1.83	1.07	1.90	1.12
All customers	3.14	1.85		
US average	1.81	1.07		
Inflation (CPI)	1.70	1.00	1.70	1.00

3
4

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[71] M. Ellis analysis of Sempra annual statistical reports, *available a*t
https://investor.sempra.com/annual-reports-and-proxy-statement [last accessed July 30, 2022]; EIA
data, *available at* https://www.eia.gov/electricity/data/eia861m/ [last accessed January 24, 2024];
BLS data, *available at* https://www.bls.gov/cpi/data.htm [last accessed January 24, 2024].

[72] For SDG&E, assumed energy equivalent is 293 kWh per mcf of natural gas.

[73] For SoCalGas in 2021, Aliso Canyon costs are added back and taxes are deducted at the average rate
in 2019 and 2020 (16%).

[74] Return on and of capital, both debt and equity, excluding and including income tax.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1	**6.** **The California Utilities' spiraling rates have hit their customers**
2	**particularly hard.**

3 **Q. What have been the affordability implications of these rate increases for the California**

4 **Utilities' customers?**

5 A. Utility consumers in California have had particular difficulty affording their utility bills.

6 Figure 6 presents arrearage rates compiled by the National Energy Assistance Directors

7 Association for January 2023. The California Utilities have among the highest arrearage rates

8 in the country. SDG&E, at 25.1%, is second only to Fitchburg, Massachusetts, a city with

9 one-third lower incomes and four times more heating degree-days than San Diego. Excluding

10 solar customers, SDG&E's arrearage rate is over 30%.[75]

11 **Figure 6. Utilities with highest arrearage rates**[76]

12 January 2023

13

14

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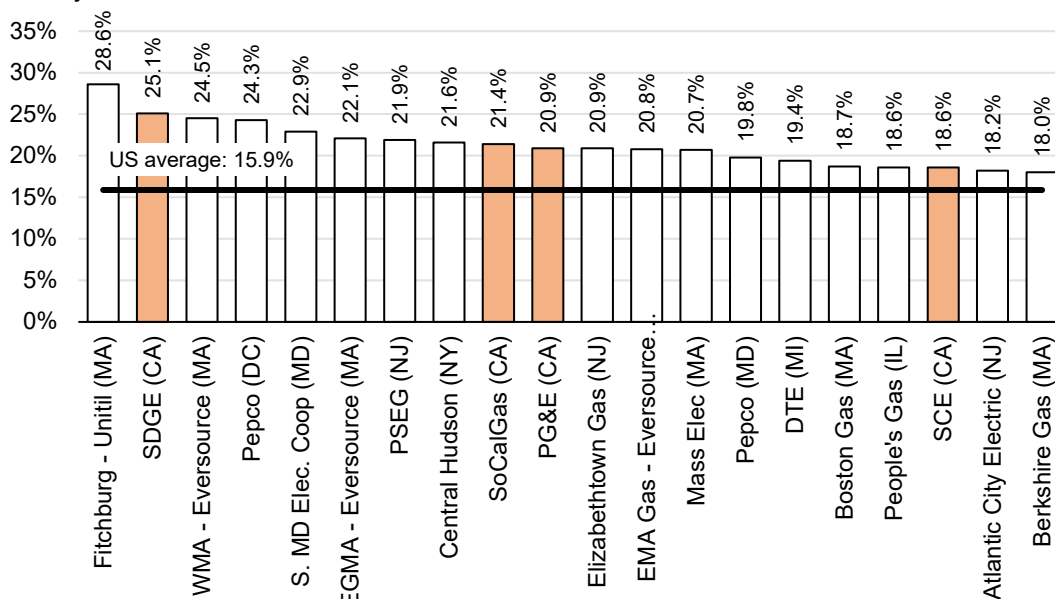
[75] Fitchburg has only 7% fewer cooling degree-days than San Diego. *See* United States Census Bureau, San Diego, CA, https://www.census.gov/quickfacts/fact/table/sandiegocitycalifornia/INC110222 [last accessed Jan. 25, 2024]; United States Census Bureau, Fitchburg, MA https://www.census.gov/quickfacts/fact/table/fitchburgcitymassachusetts/PST045223 [last accessed Jan. 25, 2024]; Golden Gate Weather Services, Heating Degree Days, https://ggweather.com/normals/hdd.html [last accessed Jan. 25, 2024]; Golden Gate Weather Services, Cooling Degree Days, https://ggweather.com/normals/cdd.html [last accessed Jan. 25, 2024].

[76] National Energy Assistance Directors Association, *End of Winter Energy Update* (April 2023), p. 1-4 *available at* https://neada.org/wp-content/uploads/2023/04/eowapril2023.pdf.

1

III. **THE COMMISSION SHOULD REQUIRE THE UTILITIES TO PROVIDE QUANTITATIVE ANALYSIS OF THE INTER-RELATIONSHIP BETWEEN ROE AND CREDIT METRICS TO SUPPORT THEIR CAPITAL STRUCTURE AND ROE PROPOSALS.**

A. **ROE and Capital Structure Both Affect Credit Quality and Therefore Cannot Be Determined Separately.**

Q. How does capital structure impact customer costs?

A. Capital structure refers to the share of a utility's investment that is funded by debt and equity. Because equity generally has a higher cost than debt, assuming no change in authorized ROE, a higher equity-to-total capital ratio (E/C) tends to increase customer costs. Investors' interest in a higher equity ratio, which increases their income, therefore conflicts with customers' interest in lower costs.

Q. How does capital structure impact a utility's credit quality?

A. A primary determinant of a company's credit quality – its anticipated ability to repay its debts – is the amount of debt outstanding relative to the total amount of capital, both debt and equity, invested in the company. In general, a higher equity ratio tends to improve a utility's credit quality. Equity ratio is not the only determinant of credit quality, though. As will be explained in more detail below, credit quality is also determined by the amount of cash available to service the debt.

1. **ROE and capital structure interact to affect key credit metrics.**

Q. Please explain the relationship between ROE and capital structure.

A. The direct testimony of SDG&E witness Maritza Mekitarian, the company's Director of Financial Planning, explains that cash flow is an important consideration in determining an appropriate capital structure:

> Credit metric guidance provided by the credit rating agencies is an important guide to determining the appropriate amount and use of debt. The major credit rating agencies commonly employ several key metrics to quantify financial risk, such as funds from operations ("FFO") as a percent of total debt and debt as a percentage of total capital. The FFO-to-Total Debt ratio measures funds from operations as a percent of total debt. It indicates how much of its debt a

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1	company could retire with annual cash from operations. A higher figure
2	indicates a stronger ability to retire its debt, and thus lower financial risk.
3	Together with their assessment of business risk and regulatory framework, the
4	major credit rating agencies use these financial metrics to help determine the
5	credit ratings they assign.[77]

6   Ms. Mekitarian describes the importance of the ratio of cash flow – S&P's FFO and

7   Moody's cash flow from operations (CFO)[78] – to debt in rating agencies' assessments of

8   utility credit quality and assignments of credit ratings. Indeed, cash flow-to-debt (CF/D) is

9   the primary metric the rating agencies use in assessing credit quality: it is the sole

10   quantitative metric mentioned among the factors that could lead to an upgrade or downgrade

11   in Moody's Credit Opinions. Page 3 of Exhibit SDG&E-18-C, Moody's June 23, 2022,

12   Credit Opinion for SDG&E, provides an example of these CF/D thresholds: 24% for an

13   upgrade to A2, 20% for a downgrade to Baa1.[79]

14   Ms. Mekitarian does not explain that net income is a key component of FFO and CFO.[80]

15   Net income, in turn, is the product of rate base, equity ratio, and ROE. Consequently, ROE

16   and equity ratio interact to determine FFO and CFO. In the context of the regulatory

17   objective of setting a capital structure that appropriately balances customer and investor

18   interests, as ROE increases, the amount of debt in the capital structure can also increase

19   while still maintaining the utility's credit quality; similarly, as the ROE declines, the equity

20   ratio would need to increase to maintain the same creditworthiness.

21

22   **2.**   **Utilities should be required to analyze quantitatively the interaction of**
23   **ROE and capital structure in their ROE and equity ratio proposals.**

24   **Q. How do the Utilities determine their equity ratio proposals?**

25   A. Most often, they simply calculate the average book-value equity ratio of the ROE proxy

26   group and perhaps adjust upward or downward to reflect utility-specific risks or other

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[77] Exhibit SDG&E-02 (Mekitarian), p. 3-4.

[78] Exhibit SDG&E-02 (Mekitarian), p. 17.

[79] Exhibit SDG&E-18-C, p. 3 (Moody's Investor Service Credit Opinion, *San Diego Gas & Electric Company Update to credit analysis* (June 23, 2022)); *see also* Exhibit SDG&E-02 (Mekitarian), p. 17.

[80] The basic definition of FFO (or CFO pre-WC) is net income + depreciation and amortization + deferred taxes. Based on personal correspondence with Nana Hamilton, VP-Senior Analyst, Moody's Investor Service, Nov. 21 - Dec. 4, 2023.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   considerations.[81] Curiously, while the Utilities' capital structure and ROE testimonies discuss

2   the importance of cash flow metrics, none attempts to explicitly quantify the inter-

3   relationship between ROE and capital structure and incorporate their interaction into the

4   Utilities' ROE and equity ratio recommendations. As a result, how much their proposed ROE

5   and/or the equity ratio could be modified to reduce customer costs while still maintaining

6   their desired investment-grade credit ratings cannot be assessed from their testimony. This is

7   a significant, material oversight.

8

9   **Q. How should a utility's capital structure be analyzed?**

10 A. As the Moody's Credit Opinion excerpted in Figure 7 demonstrates, credit rating agencies set

11 quantitative cash flow-to-debt thresholds that correspond to different credit ratings. These

12 thresholds can be used to more rigorously determine the combination of equity ratio and

13 ROE that optimally balances investor and customer interests.

14   Figure 8 illustrates the relationships between equity ratio, ROE, and CF/D. The

15 horizontal axis is the equity ratio; the vertical axis is cash flow-to-debt. The light orange

16 horizontal band represents the range of cash flow-to-debt that corresponds to the utility's

17 desired credit rating. The dark orange arcing lines correspond to different levels of authorized

18 ROE, with increasing line thickness representing increasing ROE. Holding E/C constant,

19 CF/D declines as ROE is reduced (moving down from a thicker ROE line to a thinner line).

20 But the decline in CF/D when ROE is reduced can be reversed by increasing E/C (moving

21 along the thinner ROE line up and to the right). Any number of combinations of ROE and

22 E/C can meet the level of CF/D needed to maintain a utility's credit rating. A higher ROE

23 requires less equity to maintain the same CF/D and credit rating; a lower ROE can maintain

24 the same FC/D and credit rating if it is paired with a higher E/C.

---

[81] Exhibit SDG&E-04 (Coyne), p. 66-68.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   **Figure 7. Relationships between E/C, ROE, and FFO/debt**

Figure 7. Relationships between E/C, ROE, and FFO/debt

>>Increasing cash flow/debt>>

Target CF/D range

Decreasing ROE

>>Increasing equity ratio>>

2

3
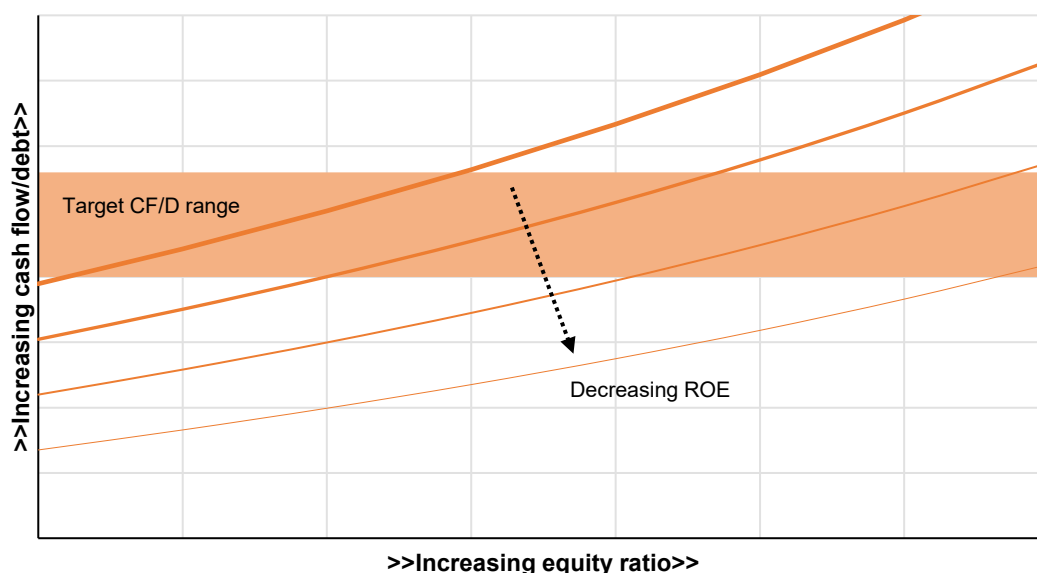
4   **B.   COE and Therefore the Appropriate ROE Are Also Affected by Capital**
5   **Structure.**

6   **Q. How does capital structure affect the cost of equity?**

7   A. At any given ROE, a lower equity ratio tends to raise the *cost* of equity. Similarly, at any

8   given equity ratio, a lower ROE also tends to raise the cost of equity. This can be understood

9   intuitively. The cash generated by a business is pledged to holders of its debt and equity, with

10   debtholders having first priority. As the equity ratio or ROE declines, a smaller share of the

11   cash goes to equity owners. To the extent there is uncertainty in the total cash generated, it is

12   amplified by a lower equity ratio or ROE, increasing the risk of those cash flows. This

13   increased risk is reflected in a higher cost of equity.

14   Inevitably, the equity ratios and ROEs of the companies selected for inclusion in rate of

15   return proxy groups will vary. Their COEs will likewise vary and will only be applicable to

16   their specific equity ratios. The publicly-traded utility holding companies that are, of

17   necessity, used in proxy groups also often hold debt at the parent level, so their equity ratios

18   and COEs will not accurately reflect even those of their own utility subsidiaries. For these

19   reasons, the resulting proxy group COEs must be adjusted to reflect differences in equity

20   ratio.

21

1   **1.**   **COE estimates should account for differences in proxy group**
2   **members' capital structures.**

3 **Q. How should the proxy group COE estimates be adjusted for differences in capital**

4   **structure?**

5 A. Commonly used COE models produce levered costs of equity, i.e., the cost of equity when

6   there is debt in the capital structure. To account for differences in capital structure among the

7   proxy group members, the levered COE results should be unlevered to estimate the cost of

8   equity assuming 100% equity financing.[82] In the CAPM, the unlevered cost of equity, k_u, is

9   typically expressed as an adjustment to beta:

10 $$k_u = r_f + \beta_u \left(r_m - r_f \right)^{[83]}$$

11   where the unlevered beta, β_u, is expressed in terms of the levered equity beta, β_e:

12 $$\beta_u = \frac{E}{D+E} \beta_e^{[84]}$$

13   For consistency and comparability, the same methodology – unlevering relative to the

14   risk-free rate, not the company's cost of debt – should be applied to the MS DCF model

15   results:

16 $$k_u = r_f + \frac{E}{D+E} \beta_l \left(r_m - r_f \right)$$

17 $$k_e - r_f = \beta_l \left(r_m - r_f \right)$$

18 $$k_u = r_f + \frac{E}{D+E} \left(k_e - r_f \right)$$

19 $$k_u = \frac{D}{D+E} r_f + \frac{E}{D+E} k_e$$

20   where D and E refer to debt and equity, respectively.

---

[82] The unlevered cost of equity differs from the weighted average cost of capital ("WACC"). The unlevered cost of capital assumes 100% equity financing; the WACC assumes the company's current capital structure. While under the Modigliani and Miller theorem of capital structure independence, the cost of capital should be the same regardless of capital structure, the WACC typically overstates the unlevered cost of equity because the *expected* return on corporate debt is lower than the yield due to default and liquidity risk.

[83] See, e.g., Aswath Damodaran, *Damodaran on Valuation: Security Analysis for Investment and Corporate Finance* (2d ed. 2006), p. 129.

[84] Unlevered beta is sometimes adjusted for taxes (the "Hamada" adjustment). As explained in *Valuation*, when the capital structure is constant over time, as it is with utilities, then the value of tax shields tracks the value of operating assets. Thus, the risk of tax shields will mirror the risk of operating assets and have the same discount rate, i.e., the unlevered cost of equity. Damodaran, *Damodaran on Valuation: Security Analysis for Investment and Corporate Finance* at 790-93.

1   Best practice is to use market, not book, values for both debt and equity as market reflects

2   investors' actual exposure and expected returns; they buy and sell securities at market value,

3   not book.[85] Market values for the debt carried by proxy group members are not readily

4   available, though, so book value is typically assumed.

5   For illustrative purposes, Figure 9 shows the SDG&E levered COE results from my

6   Phase 1 direct testimony,[86] along with their market equity ratios and unlevered COEs. The

7   variation in the unlevered COE estimates is much lower than in the levered COEs, with

8   approximately one-third the standard deviation (0.19 vs 0.45) and half the range (0.82 vs.

9   1.63). The underlying businesses of the proxy group members are very similar, so their risk

10   profiles and corresponding overall costs of capital are expected to be similar, as well. Their

11   equity ratios vary considerably, though, from 41% to 75%, which introduces variation in

12   their levered costs of equity. This variation due to differences in equity ratios makes levered

13   COEs an inappropriate basis for determining the ROE of the target company, which will

14   likely have a different equity ratio.

---

[85] *See, e.g.*, Tim Koller et al., *Valuation*, McKinsey & Co. (3d ed. 2000), p. 204 ("Where possible, you
should estimate *market* values of the elements of the current capital structure") (emphasis added).
[86] Exhibit PCF-01 (Ellis), p. 50, 59.

Figure 8. SDG&E proxy group levered COEs, equity ratios, and unlevered COEs[87]
As of June 2022

Utility	Levered COE			Market E/C	Levered COE		
	DCF	CAPM	Average		DCF	CAPM	Average
Electric							
Alliant Energy	5.40	4.98	5.19	64.8	4.59	4.32	4.45
Ameren	5.34	4.58	4.96	61.5	4.48	4.01	4.24
American Electric Power	6.00	4.54	5.27	56.5	4.74	3.91	4.33
Avista	6.98	5.46	6.22	55.1	5.24	4.40	4.82
Black Hills	5.85	5.02	5.43	50.9	4.50	4.08	4.29
CMS Energy	5.79	4.22	5.01	59.9	4.71	3.77	4.24
Consolidated Edison	5.36	4.02	4.69	56.7	4.38	3.62	4.00
Duke Energy	6.41	4.50	5.46	52.8	4.85	3.84	4.34
Edison International	6.82	5.82	6.32	41.4	4.64	4.23	4.43
Entergy	6.50	5.46	5.98	44.5	4.61	4.15	4.38
Evergy	6.09	5.06	5.57	56.4	4.79	4.20	4.49
Eversource Energy	5.73	4.94	5.34	58.1	4.63	4.17	4.40
IDACORP	4.73	5.34	5.03	74.5	4.31	4.77	4.54
NorthWestern	6.57	4.94	5.75	55.8	5.03	4.13	4.58
OGE Energy	5.99	5.70	5.84	59.9	4.83	4.66	4.74
Pinnacle West	6.84	4.42	5.63	48.9	4.93	3.74	4.34
Portland General Electric	5.85	5.18	5.51	55.8	4.64	4.26	4.45
Southern Company	6.35	5.06	5.70	56.6	4.94	4.21	4.57
WEC Energy Group	5.49	4.22	4.85	67.3	4.71	3.85	4.28
Xcel Energy	5.42	4.54	4.98	60.7	4.51	3.97	4.24
Mean	**5.98**	**4.90**	**5.44**	**56.9**	**4.70**	**4.11**	**4.41**
Standard deviation	0.60	0.51	0.45	7.5	0.23	0.29	0.19
High	6.98	5.82	6.32	74.5	5.24	4.77	4.82
Low	4.73	4.02	4.69	41.4	4.31	3.62	4.00
Range	2.25	1.80	1.63	33.1	0.92	1.15	0.82

Although their methodologies differ from mine, witnesses for PG&E and SCE also

recognized the need to adjust COE model results for differences in capital structure among

proxy group companies.[88]

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[87] M. Ellis analysis of Exhibit PCF-01 (Ellis), p. 50, 59 and S&P GMI data, *available at* https://www.spglobal.com/marketintelligence/en/ [last accessed Jan 21, 2024].

[88] Witnesses Villadsen (SCE) and Vilbert (PG&E) both adjust their CAPM and ECAPM model results for differences in capital structure among their proxy group members ("Financial Risk Adjusted Method" and "Hamada Adjustment"). They do not explain why they do not similarly adjust their other model results, which are also affected by differences in capital structure among the proxy group members. Exhibit SCE-02 (Villadson), Appendix B, p. 4-10; Exhibit PG&E-01 (Vilbert), p. 2-43 – 2-53.

1   **2.**   **Utilities' ROE proposals should reflect *their* proposed equity ratios,**
2   **not the proxy group members'.**

3 **Q. How do you use the proxy group average unlevered COE to determine the ROE, which**

4   **is levered?**

5 A. The unlevered COE is "relevered" using the same formula described above, the terms of

6   which can be rearranged as:

7 $$k_e = \frac{D+E}{E} k_u - \frac{D}{E} r_f.$$

8 As explained above, the equity ratio required to maintain a desired credit rating depends on

9   the ROE. ROE, in turn, depends on the equity ratio. They can be determined jointly, in an

10   iterative calculation process that is easily performed in common spreadsheet software like

11   Microsoft Excel or Google Sheets.

12

13   **C.**   **ROE and Equity Ratio Should Be Optimized to Minimize Customer Costs**
14   **While Meeting Investor Requirements.**

15   **1.**   **Utilities' ROE and E/C proposals are not optimized to minimize**
16   **customer costs while ensuring investor interests are also satisfied.**

17 **Q. Do the Utilities do any similar analysis to optimize their ROE and capital structure to**

18   **minimize customer costs?**

19 A. Utilities almost universally assert that any reduction from their proposed equity ratio or ROE

20   would cost customers more over the long term. For example, SDG&E witness Mekitarian,

21   citing Moody's June 23, 2022, Credit Opinion for SDG&E claimed:[89]

22   Moody's has explicitly stated that adopting SDG&E's capital structure
23   proposal is credit supportive, which could reduce costs for ratepayers.

24   PG&E witness Margaret Becker, Vice President and Treasurer, similarly maintained:[90]

25   Artificially lowering the authorized ROE would actually harm customers in
26   the long-term. Investors have choices about where to invest their capital. If the
27   Commission were to artificially reduce PG&E's authorized ROE to address
28   customer affordability concerns, investors would attribute even more risk to

---

[89] Exhibit SDG&E-07 (Mekitarian), p. 3.
[90] Exhibit SDG&E-07 (Mekitarian), p. 5.

| 1 | PG&E and invest elsewhere or require higher returns, which would ultimately |
| 2 | increase customer cost. |

3   First of all, while Moody's did say SDG&E's proposed capital structure would be credit

4   supportive, Moody's did not say SDG&E's proposed capital structure "could reduce costs for

5   ratepayers." "Credit supportive" by no means necessarily implies lower-cost for customers;

6   often, it's just the opposite. A 25% ROE and 75% equity ratio would be "credit supportive"

7   but would clearly increase customer costs.

8   Witness Becker's logic is similarly flawed. All else equal, a lower ROE would increase

9   the risk of PG&E's stock and its *cost* of equity. But Ms. Becker seems not to understand that

10   customers don't actually pay the cost of equity; they pay the authorized ROE. She conflates

11   the two, seemingly assuming that PG&E's cost of equity is automatically whatever PG&E

12   proposes for its ROE. This type of nonsensical circular logic unfortunately plagues utilities'

13   rationalizations for their ROR proposals.

14   The regulator is obligated to minimize customer costs, not the risk in the utility's stock

15   price. If the utility's proposed ROE is higher than its cost of equity, the regulator is obligated

16   to reduce it. All else equal, reducing the ROE will increase the risk of the stock, but, as I will

17   explain in Section III.C.2 below, the regulator can optimize the ROE and equity ratio to

18   minimize customer costs while "dialing in" any desired level of investor risk.

19

20   **Q. But could the ROE or equity ratio be reduced so much that the increases in the cost of**

21   **equity or cost of debt overwhelm the customer savings?**

22   A. Instead of the Utilities' hand-wavy arguments, let's look at examples using real data. Figure

23   10 applies the analysis illustrated in Figure 8 to the financial data provided in Moody's May

24   2022 Credit Update for SDG&E.[91] As before in Figure 8, different levels of ROE are

25   represented by the upward curving lines. As the equity ratio increases along the horizontal

26   axis, so does the cash flow-to-debt ratio, depicted on the vertical axis. Two arcs are shown.

27   The black arc corresponds to SDG&E's requested 10.55% ROE. The second, orange arc

28   reflects the ROE-equity ratio combinations that appropriately balance the consumer and

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[91] Moody's Investors Service, *San Diego Gas & Electric Company: Update to credit analysis* (June 23, 2022). Data from Moody's is used, not the financial data in SDG&E's regulatory filing, because Moody's makes various adjustments to SDG&E's reported financials that are not explained in sufficient detail to replicate using SDG&E's data.

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1   investor interests, with the ROE set equal to SDG&E's unlevered COE, 4.41% from Figure 9

2   above, relevered according to the formula discussed above.

3   At SDG&E's proposed 10.55% ROE and 54% E/C (Scenario 1), CF/D is 26.3%, well

4   above the estimated 22% needed to sustain its then-current A3 rating, and sufficient to give it

5   an A1 rating.[92] At SDG&E's proposed 10.55% ROE, its equity ratio could be as low as

6   48.9%, and it would still maintain the 22% CF/D required for an A3 rating (Scenario 2).

7   Similarly, at SDG&E's proposed 54% E/C, its ROE could be as low as 7.46% and SDG&E

8   would still maintain an A3 rating (Scenario 3). All three of these ROE-equity ratio

9   combinations are above the orange COE arc. The ROEs are higher than the COE, in violation

10   of the ROR=COC standard, i.e., they would effect a wealth transfer from consumers to

11   shareholders.

12   If instead we adhere to the ROR=COC standard, to maintain SDG&E's A3 credit rating

13   with an ROE set equal to its cost of equity would require a 58.2% equity ratio and 5.35%

14   ROE (Scenario 4).

---

[92] CF/D required to maintain A3 credit rating is estimated as the midpoint of the 20% downgrade and 24% upgrade thresholds provided in in Moody's June 2022 SDG&E Credit Opinion. CF/D required to achieve A1 credit rating is estimated from Moody's utility rating methodology (Moody's Investor Service, *Regulated Electric and Gas Utilities* (June 23, 2017), p. 22, *available at* https://ratings.moodys.com/api/rmc-documents/68547).

1 **Figure 9. Illustrative relationship between equity ratio, ROE, and credit quality for**
2 **SDG&E**

3
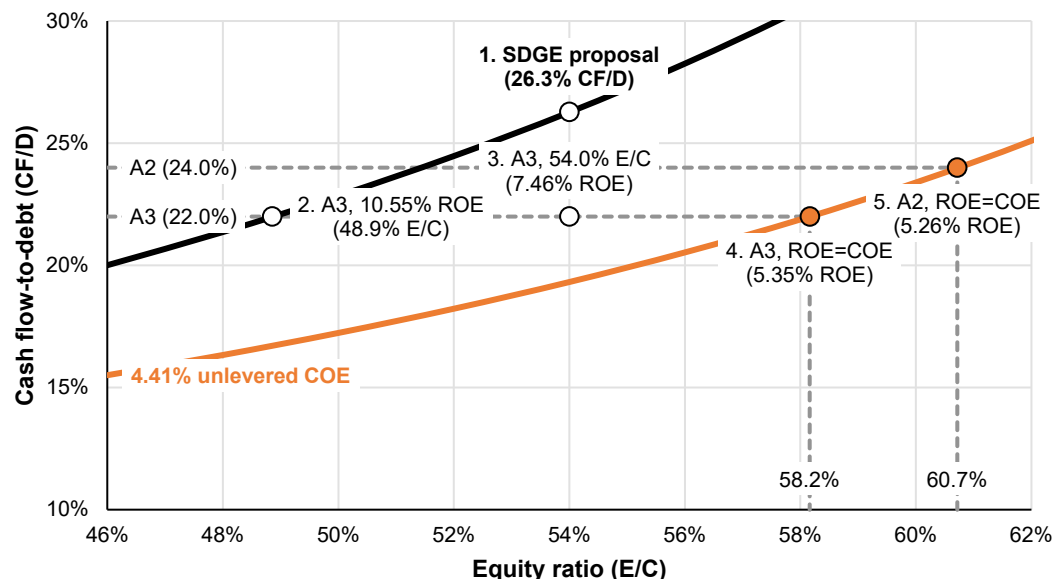
4 **Q. What if SDG&E wanted to improve its credit rating while still adhering to the**

5 **ROR=COC standard? What would be the trade-off for customers?**

6 A. An improved credit rating would be equivalent to moving up and to the right along the

7 orange arc in Figure 10, to Scenario 5. The two most material implications would be a higher

8 equity ratio, 60.7%, and a lower ROE, 5.26%.

9

10 **Q. All of these scenarios reduce CF/D. How would the cost of debt be affected?**

11 A. The cost of debt would increase modestly. Figure 11 shows the Moody's Utility Bond Index

12 for different credit ratings, as of March 2022, the most recent full month before SDG&E

13 estimated its forward-looking embedded cost of debt in its application.[93] Moody's reports

14 interest rates only for Baa2, A2, and Aa2 ratings, so rates for intermediate ratings are

15 interpolated. The CF/D ratios corresponding to each ratio are shown on the right-hand axis.

16 Note that the increase in interest rates as credit rating declines is modest, on average only

17 0.08% per notch.

---

[93] Exhibit SDG&E-02 (Mekitarian), p. 4.

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Figure 10. Moody's Utility Bond Index interest rates and corresponding cash-flow-to-debt metrics by credit rating[94]
March 2022 monthly average
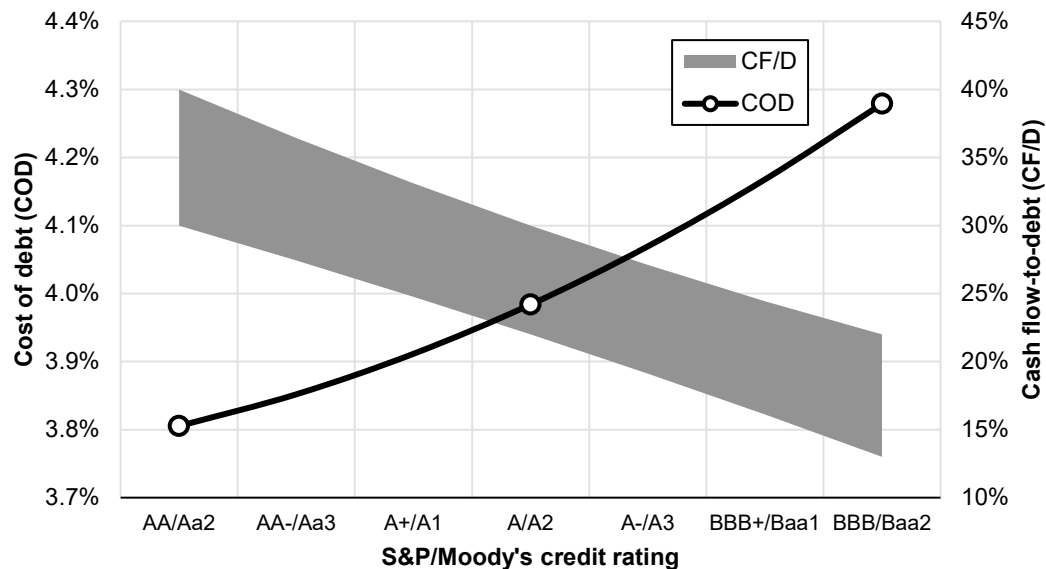
5   The change in rates would only apply to newly issued debt, not to SDG&E's entire debt

6   balance, so any increase in SDG&E's cost of debt would be attenuated. Based on SDG&E's

7   embedded cost of debt analysis, new debt accounts for 19% of the total, so SDG&E's

8   average cost of debt would change by only 19% of the change in SDG&E's marginal cost of

9   new debt.

10

11 **Q. How does the customer benefit of a lower ROE compare to the cost of a higher equity**

12 **ratio and higher cost of debt relative to SDG&E's proposal?**

13 A. The benefits and costs of different ROE-equity ratio combinations can be compared by

14   looking at the combined rate of return, the weighted average of equity and debt, grossed-up

15   for the income taxes that are passed through to customers ("customer ROR"), shown in

16   Figure 12.

17   For an apples-to-apples comparison with SDG&E's proposal, SDG&E's embedded cost

18   of debt, 3.87%, is adjusted by 19% of the *difference* in the March 2022 interest rates

19   corresponding to the various credit ratings assumed in the scenarios in Figure 10. For

20   example, the March 2022 rate corresponding to SDG&E's proposed 26.3% CF/D is 3.98%,

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[94] S&P GMI data, *available at* https://www.spglobal.com/marketintelligence/en/ [last accessed Jan 21, 2024].

1 and the March 2022 rate corresponding to Scenarios 2-4 (A3, 22% CF/D) is 4.11%, or 0.13%

2 higher. In Scenarios 2-4 SDG&E's marginal cost of debt is estimated as 3.87% + 0.13% =

3 4.00%, and its embedded cost of debt is estimated as 0.19 x 4.00% + 0.81 x 3.87% = 3.90%.

4   For each scenario, Figure 12 calculates the COD and corresponding ROR and customer

5 ROR under more conservative assumptions. The "100%" assumption sets SDG&E's

6 embedded COD equal to the marginal COD; this is intended to reflect the long-term impact

7 of a change in SDG&E's credit rating. The "Maximum" assumption also sets the embedded

8 COD equal to the marginal COD. In addition, Maximum assumes the marginal COD is equal

9 to SDG&E's embedded COD plus the credit adjustment from the historical month

10 (December 2008) in which credit spreads were the highest recorded since 1992, averaging

11 0.37% per notch, roughly 4x the historical average – an extremely conservative case for

12 assessing how erosion in credit quality might affect customer costs.

13   Scenario 2 demonstrates that, even if we accept that SDG&E's proposed ROE reflects its

14 true cost of equity – although we should be skeptical, given that it was developed without

15 any consideration of credit metrics – scope exists for a lower equity ratio, 48.9%, to reduce

16 the tax-affected customer ROR by 5.4% without jeopardizing SDG&E's current credit.

17 Figure 12 also shows the impact of the various scenarios on SDG&E's total revenue (or

18 average customer rate), under "ΔSDG&E." Under SDG&E's proposal, the customer cost of

19 capital – interest, net income, income tax – accounts for 27.5% of total revenue, so a 5.4%

20 reduction in customer ROR would reduce customer costs by 1.5%.

21   Reducing the ROE to the minimum required to maintain an A3 credit rating at a 54% E/C

22 (Scenario 3) would produce substantially more savings: 23.6% in customer ROR and 6.5% of

23 total customer costs. Adhering to the ROR=COC standard at SDG&E's current A3 credit

24 rating (Scenario 4) produces even more savings, 38.3% in customer ROR and 10.6% of total

25 customer costs. Scenarios 3 and 4 demonstrate that, in general, reducing the ROE, even if it

26 requires a higher equity ratio, is a much more effective way to reduce customer costs than

27 reducing the equity ratio.

Figure 11. Customer rate of return and savings relative to SDG&E proposal
Percent

	Assumption	Scenario				
		1. SDG&E proposal	2. A3, 10.55% ROE	3. A3, 54.0% E/C	4. A3, ROE=COE	5. A2, ROE=COE
ROE		10.55	10.55	7.46	5.35	5.26
E/C		54.0	48.9	54.0	58.2	60.7
CF/D		26.3	22.0	22.0	22.0	24.0
COD	Embedded	3.87	3.90	3.90	3.90	3.89
	100%	3.87	4.00	4.00	4.00	3.94
	Maximum	3.87	4.52	4.52	4.52	4.19
ROR	Embedded	7.48	7.15	5.82	4.74	4.72
	100%		7.20	5.87	4.79	4.74
	Maximum		7.47	6.11	5.01	4.84
Customer ROR[95]	Embedded	9.36	8.85	7.16	5.77	5.77
	100%		8.90	7.20	5.82	5.79
	Maximum		9.17	7.44	6.03	5.89
ΔSDG&E Customer ROR	Embedded		-5.4	-23.6	-38.3	-38.3
	100%		-4.9	-23.0	-37.9	-38.1
	Maximum		-2.0	-20.5	-35.5	-37.1
Revenue	Embedded		-1.5	-6.5	-10.6	-10.5
	100%		-1.3	-6.3	-10.4	-10.5
	Maximum		-0.6	-5.6	-9.8	-10.2

Because the incremental cost of debt at an A3 credit rating is small (0.13%), the "100%" assumption produces nearly identical savings as the "Embedded" scenarios.

Comparing Scenarios 4 and 5 provides insight into the potential customer value of improving SDG&E's current A3 credit rating. The difference in customer costs is negligible under the Embedded and 100% COD assumptions (0.1% of revenue) but are more substantial under the Maximum assumption (0.4% of revenue). This demonstrates that in times of market turmoil, like during the financial crisis in 2008-09, there is some benefit to customers of a higher credit rating.

Nonetheless, the difference in the customer ROR under even Maximum assumptions is only 0.14% (6.03% for A3 vs. 5.89% for A2). This result is consistent with the Modigliani and Miller theorem of capital structure independence, which states that the cost of capital should be the same regardless of capital structure.

It should be kept in mind that all scenarios along the orange arc are calculated to ensure they provide sufficient return to satisfy the interests of both debt and equity investors.

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[95] Based on an income tax rate of 24.8% from A.22-05-015/016, Exhibit SDG&E-44-R, Prepared Direct Testimony of Ryan Hom – Summary of Earnings (August 2022), Appendix B, Table RH-1.

1   Scenarios above the orange arc, such as SDG&E's proposal or even reductions in ROE or

2   E/C that aren't simultaneously optimized, fail to properly balance the customer and investor

3   interests and needlessly transfer wealth from customers to investors.

4

5   **2.   The trade-off between ROE and E/C highlights the need for more**
6   **rigorous, quantitative analysis.**

7   **Q. What does your analysis tell us about the trade-offs between ROE, equity ratio, the cost**

8   **of debt, and customer ROR?**

9   A. At typical utility credit ratings, savings from a lower ROE, after grossing up for taxes,

10   generally more than make up for the incremental cost of any additional equity required in the

11   capital structure, or any additional interest costs arising from a lower credit rating. Figure 13

12   compares SDG&E's incremental customer cost, in billions of dollars, of debt and equity

13   under Scenarios 2-5 relative to SDG&E's proposal. Under no scenario does the incremental

14   cost of debt, if there is any, outweigh the savings from a lower ROE or lower equity ratio. In

15   the two ROE=COE scenarios the customer costs of both debt and equity are reduced under

16   all but the Maximum assumptions.

17   **Figure 12. Incremental customer interest and ROE costs/savings relative to SDG&E**
18   **proposal**
19       $ billion

		Scenario			
	Assumption	2. A3, 10.55% ROE	3. A3, 54.0% E/C	4. A3, ROE=COE	5. A2, ROE=COE
Cost of debt	Embedded	0.02	0.00	-0.01	-0.02
	100%	0.02	0.01	-0.01	-0.02
	Maximum	0.05	0.03	0.01	-0.01
Tax-affected ROE	Embedded	-0.06	-0.20	-0.31	-0.30
	100%	-0.06	-0.20	-0.31	-0.30
	Maximum	-0.06	-0.20	-0.31	-0.30
Total	Embedded	-0.05	-0.20	-0.32	-0.32
	100%	-0.04	-0.19	-0.31	-0.32
	Maximum	-0.02	-0.17	-0.30	-0.31
ROE/COD ratio	Embedded	-3.4	-195.9	22.8	13.0
	100%	-2.7	-37.2	32.1	14.2
	Maximum	-1.4	-7.4	-31.3	24.2

20

21   Total customer costs can be reduced by decreasing the ROE while increasing the equity

22   ratio to maintain the utility's creditworthiness (i.e., its cash flow-to-debt) because the trade-

1 off is not one-for-one. For example, net income accounts for about 50% of SDG&E's cash

2 flow; other items, such as depreciation, amortization, and deferred taxes, account for the rest.

3 Consequently, a relatively large reduction in net income due to a sharp cut in ROE would

4 reduce cash flow by only half as much in percentage terms. In addition, ROE is grossed-up

5 for taxes, which are not included in FFO and CFO, so the savings to customers from a lower

6 ROE are amplified. Rather than "lever up," i.e., reduce the equity ratio and increase debt, it is

7 often more cost-effective to use any spare credit capacity to reduce the utility's ROE, or even

8 to increase the equity ratio if necessary to maintain a target credit rating, than to increase

9 debt.

10 Reducing ROE and increasing the equity ratio has the additional benefit of reducing debt-

11 to-capitalization, the key metric used by rating agencies to assess credit quality identified in

12 Ms. Mekitarian's testimony.[96]

13

14 **Q. The integrated analysis you propose sounds complicated. Is it reasonable to expect**

15 **utilities, PUC staff, and intervenors to learn how to do it?**

16 A. I have a few thoughts about this.

17 First, the analysis is much simpler than it might seem – a relatively small spreadsheet

18 model in comparison to what utilities commonly prepare for a rate case and their cost of

19 capital experts use in preparing their testimony. The Utilities are already intimately familiar

20 with these types of analyses; I worked in a utility, which is where I learned it. I can tell you

21 from that experience that each of their CFOs watches their cash flow-to-debt ratio like a

22 hawk, because it's the key metric the rating agencies care about. Although the ROE (levered

23 COE) and equity ratio models are integrated, the *un*levered cost of equity calculation is

24 separate and entails only one additional calculation step than a conventional COE analysis.

25 Second, as I will explain in Sections IV and VI below, I recommend eliminating several

26 common, but flawed and therefore unnecessary, COE-related analyses, which would

27 significantly reduce the amount of time, effort, and resources required of all the parties in a

28 COC proceedings.

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[96] Exhibit SDG&E-02 (Mekitarian), p. 4.

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1   Third, greater financial sophistication and more explicit, quantitative assessment of

2   financial matters among regulators and intervenors would be reassuring to both investors and

3   the public that their respective interests were being appropriately considered and balanced.

4   Fourth, and perhaps most important, the foregoing analysis demonstrates the tremendous

5   customer value at stake in getting the COC right: in excess of 10% of Utilities' requested

6   revenue, billions of dollars a year across the entire state. PUC staff and intervenors would be

7   remiss not to invest their time and energy to develop the financial acumen to better

8   understand these basic inter-relationships between capital structure, credit ratings, and the

9   cost of equity, and to acquire the analytical skills to better scrutinize the Utilities' proposals.

10   Businesspeople often refer to ROI – return on investment. The incremental cost of

11   developing and deploying this expertise would likely be on the order of $1 million per year,

12   perhaps just a fraction of that. The savings to California utility customers would be in the

13   billions of dollars per year – more than a 1,000x ROI. I can guarantee acquiring such

14   financial expertise is the absolute last investment utility executives want the regulatory and

15   intervenor community to make – which is a sure sign it is the first one they *should* make.

16

17   **Q. Please summarize why the Commission should jointly analyze ROE and capital**

18   **structure.**

19   A. Utilities commonly maintain that any reduction in their ROE will negatively impact their

20   credit rating and increase their cost of debt and therefore customer costs.[97] Despite lengthy

21   discussion of the potential *directional* impact of a lower ROE or equity ratio on their credit

22   rating, they fail to provide any analysis that *quantifies* either the trade-off between ROE and

23   COD or how the equity ratio can be adjusted to accommodate a lower ROE to reduce

24   customer costs and meet equity investor expectations while maintaining the utility's target

25   credit rating.[98]

26   The Commission should require utilities to provide such analysis in justifying their ROE

27   and capital structured proposals. As the foregoing analysis demonstrates, the potential

---

[97] *See, e.g.*, Exhibit SDG&E-08 (Coyne), p. 4-5 ("All models are subject to certain limiting
assumptions. However, in market conditions where ROE estimation models are producing return
estimates as low as the current cost of debt (e.g., Mr. Ellis' CAPM), utility regulators recognize that
such low returns are not compensatory for investors.").
[98] *See, e.g.*, Exhibit SDG&E-04 (Coyne), p. 66-68.

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1   savings to customers from optimizing the ROE and capital structure are significant – more

2   than 10% of total customer costs. Given the value at stake, the utilities' clear familiarity with

3   the relevant financial concepts, the simplicity of the analysis (easily performed with a small

4   spreadsheet model), and the ready availability of the required data, there is no reason not to

5   require more rigorous, quantitative justification of utilities' ROE and capital structure

6   proposals.

7

8

9   **IV. THE COMMISSION SHOULD PROHIBIT USE OF THE FLAWED RISK**
10 **PREMIUM MODEL BECAUSE THE MODEL'S CIRCULARITY AND USE OF**
11 **HISTORICAL AUTHORIZED ROEs RENDER THE MODEL UNRELIABLE**
12 **AND INAPPROPRIATE FOR USE IN COST OF CAPITAL PROCEEDINGS.**

13 **Q. Are all the models used to determine the rate of return in utility regulatory proceedings**

14 **widely accepted and used in finance?**

15 A. No. Several of the models that are commonly used to determine the rate of return in utility

16 regulatory proceedings are not commonly used by financial practitioners or researchers.

17 These include the Risk Premium Model (RPM), the Expected Earnings Analysis (EEA), and

18 the Empirical CAPM (ECAPM).[99]

19

20 **Q. Why are these models not used elsewhere in finance?**

21 A. The reasons these models are not commonly used elsewhere in finance vary. The RPM and

22 EEA are not used elsewhere because they do not actually estimate a cost of capital. The RPM

23 is a regression model of past regulatory ROE decisions, which may or may not reflect the

24 actual cost of capital. All three of the Utilities' cost of capital experts use it.[100] The EEA is

25 described in SDG&E witness Coyne's Phase 1 direct testimony.[101] It is based on estimates of

26 future returns on book value, but investors are rarely able to purchase stock at book value;

27 they must pay the market price, so the return on book value almost never reflects investors'

28 expected return.

---

[99] The RPM is sometimes referred to as the "Risk Premium Analysis"; EEA, "Expected Earnings Model."

[100] Exhibit PG&E-01 (Vilbert), p. 2-53-55; Exhibit SCE-02 (Villadsen), p. 49-52; Exhibit SDG&E-04 (Coyne), p. 42-45.

[101] Exhibit SDG&E-04 (Coyne), p. 45-47.

1   The ECAPM is intended to estimate the cost of equity but is conceptually flawed. It was

2   developed by utility cost of capital practitioners for use solely in utility cost of capital

3   proceedings based on a flawed interpretation of academic research. I will discuss the

4   ECAPM in more detail in Section VII.G below.

5

6   **Q. Why are models based on ROE, not COE, a problem?**

7   A. As explained above, the entire purpose of a cost of capital proceeding is just that, to

8   determine the *cost* of capital. There is substantial and robust evidence that past regulatory

9   ROE decisions do not reflect the cost of capital but have, in fact, far exceeded the cost of

10   capital. Basing future ROE decisions on historical authorized ROEs simply perpetuates these

11   errors. Looking at *actual* authorized ROEs to estimate the *required* COE is akin to

12   developing a diet recommendation based on what people *actually* eat, not what they *should*

13   eat to be healthy.

14

15   **Q. Have any regulatory authorities recognized these flaws with the RPM?**

16   A. Yes. FERC has specifically ruled out these models for use in rate of return proceedings. In

17   Opinion No. 569 (November 2019), FERC rejected the use of the RPM to estimate the cost

18   of equity:

19   [T]he Risk Premium model is likely to provide a less accurate current cost of
20   equity estimate than the DCF model or CAPM because it relies on previous
21   ROE determinations, whose resulting ROE may not necessarily be directly
22   determined by a market-based method, whereas the DCF and CAPM methods
23   apply a market-based method to primary data. For example, previous ROE
24   determinations may not involve an explicit determination as to whether an
25   ROE is just and reasonable, but instead focused on whether to allow an ROE
26   incentive adder or were approving a preexisting RTO-wide ROE for a new
27   RTO member. Similarly, many previous ROE determinations used in the Risk
28   Premium model were the product of rate case settlements. Such settlements
29   often involve compromises on a variety of issues present in a rate case, of
30   which the appropriate ROE is only one. Consequently, such settlements could
31   include ROEs that are not representative of the market cost of equity because
32   the ROEs were negotiated above or below that market cost of equity in order
33   to form an overall settlement package, together with negotiated outcomes on
34   other issues, that were acceptable to the parties.

35

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1	While all models, including the DCF, feature some circularity, such circularity
2	is particularly direct and acute with the Risk Premium model because it
3	directly relies on past Commission ROE decisions. MISO TOs' regression
4	analysis, discussed below, accentuates such circularity by largely offsetting
5	the effects of changes in interest rates. As a result, we share the concerns
6	expressed by various parties that the circularity inherent in the Risk Premium
7	model's use of prior ROE determinations would largely continue previously-
8	approved ROEs and reflect past circumstances that influenced the previous
9	ROE decisions.
10	…
11	Additionally, the record contains insufficient evidence to conclude that
12	investors rely on risk premium analyses utilizing historic Commission ROE
13	determinations or settlement approvals to determine the cost of capital and
14	make investment decisions. Investors certainly observe regulatory ROEs and
15	how changes in authorized ROE levels could affect utility earnings, but such
16	considerations differ from the type of analyses employed by the MISO TOs
17	looking back at past decisions to determine the current cost of capital. We
18	recognize that academic literature discusses this methodology, but the record
19	indicates the greater prevalence of other methods.[102]

20 Although FERC subsequently reinstated the RPM in Opinion No. 569-A (May 2020), in

21 August of 2022 the United States Court of Appeals for the District of Columbia Circuit held

22 that FERC's reinstatement of the RPM was arbitrary and capricious and has vacated Opinion

23 569-A, citing "'particularly direct and acute' circularity problems."[103]

24 I agree with the D.C. Circuit Court of Appeals and recommend the Commission adopt

25 FERC's prohibition on use of RPM.

26

27

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[102] Ass'n of Businesses Advocating Tariff Equity Coal. of Miso Transmission Customers Illinois Indus. Energy Consumers Indiana Indus. Energy Consumers, Inc. Minnesota Large Indus. Grp. Wisconsin Indus. Energy Grp., 169 FERC ¶ 61,129, p. 166-168 (2019).

[103] *MISO Transmission Owners v. FERC*, 45 F.4th 248, 264 (D.C. Cir. 2022); see also Xena Burwell, *D.C. Circuit Court of Appeals Decision Puts FERC's Revised Method for ROE Determinations in Question*, Van Ness Feldman, LLP (August 10, 2022), *available a*t https://www.vnf.com/dc-circuit-court-of-appeals-decision-puts-fercs-revised-method-for-roe-determinations-in-question.

1 **V. THE COMMISSION SHOULD PROHIBIT USE OF THE FLAWED EXPECTED**
2 **EARNINGS ANALYSIS BECAUSE OF THE MODEL'S CIRCULARITY AND**
3 **USE OF HISTORICAL OR FORECAST BOOK ROEs RENDER THE MODEL**
4 **UNRELIABLE AND INAPPROPRIATE FOR USE IN COST OF CAPITAL**
5 **PROCEEDINGS.**

6 **Q. What is the flaw in the Expected Earnings Analysis?**

7 **A.** Like the RPM, the EEA is based on the return on book equity, not the cost of equity. During

8 cross-examination, SDGE witness Coyne, the only utility expert to use the Expected

9 Earnings Analysis, agreed that the EEA is *not* based on the COE.

10

11 **Q: What did witness Coyne say during cross-examination?**

12 A: During cross-examination utility witness Coyne admitted that the cost of capital is a measure

13 of economic cost equals investors' expected returns;[104] and that the allowed, or authorized,[105]

14 cost of capital should equal investors' expected returns.[106] Mr. Coyne also admitted during

15 cross-examination that the Risk Premium Model and the Expected Earnings Analysis that he

16 used are not based on the Utilities' actual costs of equity:

17 Ms. Dickenson: Isn't it true that two of your models, the risk
18 premium analysis, RPA, and the expected earnings analysis, EEA,
19 are not based on the utilities actual cost of equity?

20 Mr. Coyne: Yeah…[107]

21 Additionally, Mr. Coyne admitted the following principles which establish that his

22 Expected Earnings Analysis is based on projected ROE estimates for his proxy group that exceed

23 investors' expected returns and thus do not equate to those utilities' actual costs of capital:

---

[104] A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 61-62, l. 22-12 [agreeing with statement in PCF-03]; *id.* at p. 62-63, l. 24-8 [agreeing with statement in PCF-04]; *id.* at p. 64, l. 4-12 [agreeing with statement in PCF-05].

[105] A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 66, l. 14-19 [Coyne testifying "allowed" synonymous with "authorized"].

[106] A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 65, l. 10-16. Ms. Dickenson: …do you agree that the allowed rate of return should equal the cost of capital? Mr. Coyne: Yes."].

[107] A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 65, l. 12-21; *see also id.* at p. 66, l. 2-6 [Coyne admitting Risk Premium model based on historical authorized ROEs].

1   (1) ROE is defined as the net income over the book value of equity for regulatory

2   purposes;[108]

3   (2) Value Line's projected ROE estimates[109] are based on authorized returns and book

4   value;[110]

5   (3) Investors cannot buy shares at book equity value; investors must pay market value;[111]

6   (4) Paying more for any given stream of cash flow necessarily results in a lower return

7   than paying less for that same stream of cash flow;[112] and

8   (5) Mr. Coyne's proxy companies all have a market value that exceeds its book value.[113]

9   The only conclusion that can be drawn is that investors in Mr. Coyne's proxy companies

10   all pay more than book value for their shares and therefore actually expect a return in an amount

11   less than Value Line's forecast ROE which is based on book value and authorized ROEs.

12   Investors' expected returns (the cost of equity) therefore must be lower than the Utilities'

---

[108] A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 71, l. 17-11.

[109] Mr. Coyne relied upon primarily on Value Line's projected ROE for his Expected Earnings analysis. (SCG-04, p. JMC-46, l. 18-19 [Coyne on behalf of SoCalGas: "I relied primarily on the projected ROE for the proxy companies as reported by Value Line for the period from 2024-2026."]; SDG&E-04, p. 46, l. 18-19 [same by Coyne on behalf of SDG&E].)

[110] A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 71-72, l. 12-6 [Dickenson: "If you divide the 4.95 earnings per share by the 47.55 book value per share, you do get 0.10; don't you? And that's consistent with that Value Line 10 percent ROE; right?" Coyne: "If you round, that would be consistent, yes." Dickenson: "So we know that Value Line uses book value in its forecast; don't we?" Coyne: "Yes, they do."]; p. 70, l. 19-20 [Coyne admitting if Value Line gets to its projected expectations of a company's earned returns "by projecting allowed to do so, then that would be one of the factors to do so. A typical expectation is the utility will earn its allowed return."]; A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 68, l. 13- 16 [Coyne admitting Value Line's forecast estimates are based on book value].

[111] A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 72, l. 17-20 [Dickenson: "But investors can't buy shares at book value; can they?" Coyne: "No. They can only buy them at market value."].

[112] A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 74 [Dickenson: "Can you think of any numerical example of an instance in which an investor could pay more for the same stream of cash flows and earn the same or higher return as if they paid less for that same stream of cash flows?" Coyne: "Well, on that basis, I would say that their return would be lower…"].

[113] A.22-04-008 et seq., Reporter's Transcript Virtual Proceeding September 12, 2022 (September 16, 2022), p. 72-73, l. 21-24 [Dickenson: "Can you think of any company in your sample that does not have a market value greater than book value?" Coyne: "No."].

1 conclusions about the appropriate ROE or any other testimony based in whole or in part on the

2 Risk Premium Model or the Expected Earnings Analysis.[114]

3

4 **Q. Did FERC find similar flaws with any other commonly used models?**

5 A. Yes. FERC similarly rejected the Expected Earnings Analysis in Opinion No. 569 and

6   affirmed its decision in Opinion No. 575 (May 2021):

7   In Opinion No. 569, the Commission explained that, under the Commission's
8   market-based approach, the Commission set a utility's ROE at the estimated
9   return that investors would require in order to purchase stock in the utility at
10   its current market price. In *Hope*, the Supreme Court explained that "the
11   return to the equity owner should be commensurate with returns on
12   investments in other enterprises having corresponding risks." The
13   Commission stated that, in order to determine this, the Commission must
14   analyze the returns that are earned on "investments in other enterprises having
15   corresponding risks." However, investors cannot invest in an enterprise at
16   book value and must instead pay the prevailing market price for an
17   enterprise's equity. As a result, the Commission states that the expected return
18   on a utility's book value does not reflect "returns on investments in other
19   enterprises" because book value does not reflect the value of any investment
20   that is available to an investor in the market, outside of the unlikely situation
21   in which market value and book value are exactly equal. Accordingly, we
22   agree with Trial Staff, PUCT, and New Orleans Council and we continue to
23   find that the Expected Earnings model is not a market-based model and
24   relying on it does not satisfy the requirements of *Hope*.[115]

25   I recommend the Commission adopt FERC's prohibitions on use of the Expected

26   Earnings Analysis.

27

---

[114] Exhibit PCF-02 (Ellis), p. 5-6, l. 7-4 [testifying that some intervenors used Risk Premium and
    Expected Earnings models "which are based, respectively, on historical authorized and forecast ROEs
    and make no reference at all to the *cost* of equity"].
[115] Order No. 575, 70 FERC ¶ 61,022, p. 92.

1	**VI.**	**WHEN UTILIZING THE DCF MODEL, THE COMMISSION SHOULD**
2		**PROHIBIT PARTIES FROM PROJECTING ANALYSTS' 3-TO-5-YEAR**
3		**GROWTH FORECASTS INTO PERPETUITY.**

4 **Q. Please describe the version of the DCF model that is commonly implemented**

5 **incorrectly in utility regulatory proceedings.**

6 A. As explained in my Phase 1 direct testimony, one of the most widely used methods used to

7 determine the ROE in utility regulatory proceedings is the constant-growth discounted cash

8 flow model (CG DCF).[116] It is also commonly implemented with unrealistic assumptions.

9 The CG DCF is based on the well-known and widely used mathematical formula for the

10 value of a growing perpetuity stream of cash flows. It assumes a single, constant rate of cash

11 flow growth. In the CG DCF model commonly used in utility ROR analyses, the cash flows

12 are expected dividends, and the perpetuity value formula can be expressed as:

13
$$M_0 = D_0 \frac{(1 + g)}{(k - g)}$$

14 where M_0 refers to the current market value (stock price), D_0, the current dividend (typically

15 four times the most recent quarterly payment), g, the forecast perpetuity growth rate, and k,

16 the cost of equity. Rearranging terms, the cost of equity can be expressed as a function of the

17 dividend yield, d $(\frac{M_0}{D_0})$, and growth rate:

18
$$k = d(1 + g) + g$$

19 Typically, the cost of equity is estimated for each member of the proxy group, with the mean

20 or median reflecting the cost of equity for the target company.

21 The general DCF model, which can allow for varying growth rates over time, is a

22 particularly apt representation of stock returns because its assumptions realistically reflect

23 several key features of share prices and expected returns. First, the DCF model's perpetual

24 cash flow stream assumption mirrors equity's claim on a firm's cash flows into perpetuity.

25 Second, the assumption of steady growth in dividends over time reasonably reflects their

26 much greater stability relative to other potential measures of profitability, like earnings or

27 cash flow. Third, the resulting single discount rate into perpetuity is consistent with the no-

28 arbitrage principle of finance.

---

[116] Exhibit PCF-01 (Ellis), p. 34-36.

1   If investors expected higher (lower) returns in the future, they would impute that into the

2   price today and bid up (down) the price accordingly, such that near-term and long-term

3   returns roughly equilibrate.[117]

4

5   Q. **How are the input assumptions to the CG DCF model estimated?**

6   A. Estimating the current dividend yield is fairly straightforward, typically 4 times the most

7   recent quarterly dividend divided by the recent stock price. Estimating a dividend-per-share

8   (DPS) growth rate that is valid into perpetuity is more subjective. Cost of capital and

9   valuation practitioners commonly use equity analysts' growth rate forecasts as an input to

10   their DCF models. Due to data availability limitations – DPS forecasts are much less

11   common than earnings-per-share (EPS) forecasts – practitioners often use forecast EPS

12   growth rates as a proxy for DPS growth.

13

14   Q. **What is the most critical common flaw in the implementation of the CG DCF model to**

15   **estimate the COE in utility regulatory proceedings?**

16   A. The most critical common flaw in the implementation of the CG DCF is the assumption that

17   analysts' EPS growth forecasts are valid into perpetuity. This assumption is not reasonable.

18   The results of the CG DCF are particularly sensitive to the perpetuity growth rate

19   assumption. The inaccuracy introduced by assuming a relatively short-term growth rate will

20   be sustained forever therefore invalidates the results of the CG DCF as commonly

21   implemented using analysts' EPS growth forecasts.

22

---

[117] Some equity return projections vary with forecast horizon, generally due to a valuation-reversion assumption in the model, e.g., price-to-earnings ratios returning to their long-term historical average over an initial horizon and remaining at that level afterward. *See, e.g.*, *BlackRock's capital market assumptions*, *available at* https://www.blackrock.com/institutions/en-us/insights/charts/capital-market-assumptions. Whether variation in expected equity returns across different forecast horizons can be estimated with any accuracy is a subject of ongoing debate among academic and investment professionals. Some forecasters assume no mean reversion in their return forecasts. *See, e.g.,* AQR Capital Management, *2014 Capital Market Assumptions for Major Asset Classes* (1Q 2014), *available at* https://www.aqr.com/Insights/Research/Alternative-Thinking/2014-Capital-Market-Assumptions-for-Major-Asset-Classes.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   **Q. How do we know assuming analysts' EPS growth forecasts are valid into perpetuity is**

2   **unreasonable.**

3   A. I provide several reasons this assumption is unreasonable in my Phase 1 direct testimony, but

4   two are especially determinative.[118]

5

6   **Q. What is the first determinative reason it is unreasonable to assume that a utility will**

7   **maintain its current 3-to-5-year forecast growth rate into perpetuity?**

8   A. The most obvious reason is that analysts' "long-term" forecast horizons are not long-term at

9   all, especially relative to the infinite forecast horizon required by the CG DCF. Among the

10   most commonly used analyst growth rates, the forecast horizons are 3 to 5 years for S&P and

11   Zacks; 5 years for Bloomberg and Yahoo! Finance; and 6 years for ValueLine.[119]

12

13   **Q. What is the second determinative reason it is unreasonable to assume that a utility will**

14   **maintain its current 3-to-5-year forecast growth rate into perpetuity?**

15   A. The second determinative reason it is unreasonable to assume analysts' growth forecasts into

16   perpetuity is because decades of academic research has consistently found that analyst

17   forecasts tend to be upwardly biased.[120]

18   The unreasonableness of extrapolating analysts' upwardly biased growth rates into

19   perpetuity is perhaps most compellingly demonstrated by its economically impossible

20   implications. Figure 14 updates an analysis presented in my Phase 1 direct testimony[121]

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[118] Exhibit PCF-01 (Ellis), p. 37-46.

[119] Zack's, https://www.zacks.com/stocks/ [last accessed July 22, 2022]; Bloomberg, *see, e.g.*, https://pages.stern.nyu.edu/~adamodar/pdfiles/Bloombergfull.pdf; S&P, *see, e.g.*, https://ycharts.com/glossary/terms/eps_est_long_term_growth [last accessed July 22, 2022]; Yahoo! Finance, https://finance.yahoo.com/ [last accessed July 22, 2022]; Value Line, *see, e.g.,* SDG&E response to EPUC data request EPUC-SDG&E-DR-01, Q01 and SoCalGas response to EDF data request EDF-SCG-DR-01, Question 1-1 ('18-'20 to '24-'26 or '25-'27; '19-'21 to '25-'27).

[120] *See, e.g.*, Goedhart, Raj, Saxena, *Equity analysts: Still too bullish*, McKinsey Quarterly (April 2010), *available at* https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/equity-analysts-still-too-bullish. For a more recent example, see Cassella, Golez, Gulen, Kelly, *Horizon Bias and the Term Structure of Equity Returns* (2020), *available at* https://ssrn.com/abstract=3328970.

[121] Exhibit PCF-01 (Ellis), p. 43-44.

1   comparing the forecast aggregate earnings of the S&P 1500[122] to forecast U.S. GDP.[123]

2   Currently, these companies' combined earnings are equal to roughly 8% of U.S. GDP. Yet if

3   analysts' growth projections were correct, they would exceed total U.S. GDP within the next

4   decade.

5   **Figure 13. US stock market forecast earnings at analyst EPS growth rates vs. GDP**
6   As of June 30, 2023
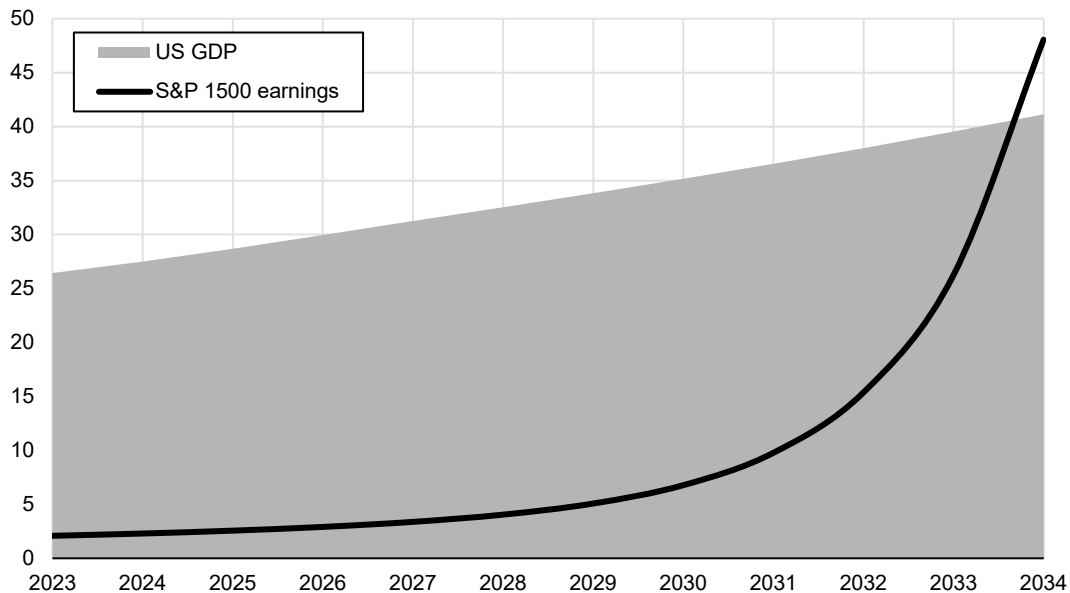
7

8   In conducting my periodic surveys of investment firm capital market assumptions reports

9   (CMAs) described in Section II.C.1 above, I review each firm's methodology, where

10   available. To estimate the aggregate market return, they all use some version of the DCF

11   model, and some use analyst forecasts to estimate near-term growth. *None* of them uses the

12   CG DCF with analysts' EPS estimates projected into perpetuity, precisely because they know

13   that doing so produces the type of economically impossible results demonstrated in Figure

14   14.

---

[122] M. Ellis analysis of S&P GMI data, *available at* https://www.spglobal.com/marketintelligence/en/ [last accessed Jan 21, 2024]. Excludes companies for which analyst growth forecasts are unavailable or with growth rates less than -100%.

[123] GDP forecast is average of Congressional Budget Office, *The 2023 Long-Term Budget Outlook* (June 2023), https://www.cbo.gov/system/files/2023-06/57054-2023-06-LTBO-econ.xlsx; U.S. Energy Information Administration, *Annual Energy Outlook 2023 Macroeconomic Indicators (*March 2023) Table 20, https://www.eia.gov/outlooks/aeo/excel/aeotab20.xlsx; U.S. Social Security Administration, *The 2023 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds* (March 2023) Supplemental Single-Year Tables, https://www.ssa.gov/OACT/TR/2023/SingleYearTRTables_TR2023.xlsx.

1   **Q. Have other cost of capital experts acknowledged the unreasonableness of assuming**

2   **analyst growth rates into perpetuity in the CG DCF model?**

3   A.   Yes. Utility cost of capital experts have also acknowledged the potential unreasonableness of

4   assuming analyst growth rates into perpetuity in the CG DCF model.

5   SDG&E witness Coyne, for example, testified in a recent rate case, "the Multi-Stage

6   DCF can be used when there is concern that short-term growth rates may not be sustainable

7   over the longer-term."[124]

8   Similarly, SCE witness Villadsen has cited a similar critique, from the Research

9   Foundation of CFA Institute, of projecting analysts' estimates beyond their forecast horizon:

10   [C]onsensus long-term earnings growth estimates routinely exceed sustainable
11   GDP growth. The current consensus growth rate for earnings on the S&P 500,
12   according to the Zacks Investment Research survey, is 10 percent, which, if
13   we assume a consensus inflation expectation of 2-3 percent, corresponds to 7-
14   8 percent real growth. Real earnings growth of 8 percent is six times the real
15   earnings growth of the past century, however, and three times the consensus
16   long-term GDP growth rate. This growth is not possible.[125]

17   Roger Morin has also acknowledged the unreasonableness of extrapolating analyst

18   growth forecasts into perpetuity, explaining:

19   Although the constant-growth DCF model does have a long history, analysts,
20   practitioners, and academics have come to recognize that it is not applicable in
21   many situations. A multiple-stage DCF model that better mirrors the pattern of
22   future dividend growth is preferable. … *The problem is that . . . from the*
23   *standpoint of the DCF model that extends into perpetuity, analysts' horizons*
24   *are too short, typically five years. It is often unrealistic for such growth to*
25   *continue into perpetuity.* … It is useful to remember that eventually all
26   company growth rates, especially utility services growth rates, converge to a
27   level consistent with the growth rate of the aggregate economy.[126]

28

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[124] New Brunswick Energy and Utilities Board Docket No. 491, Liberty Utilities (Gas New Brunswick), Prepared Direct Testimony: James M. Coyne (March 2021), p. 39.

[125] Arnott, *Equity Risk Premium Myths*, published in Research Foundation of CFA Institute, Rethinking the Equity Risk Premium (2011), p. 97 (cited in Harris, Villadsen, Lo Passo, *Calculating the Equity Risk Premium and the Risk-free Rate*, prepared for the Netherlands Competition Authority (2012), p. 30).

[126] Morin, *New Regulatory Finance* at 308 (emphasis added).

1   **Q. Are there other concerns with extrapolating analysts' 3-to-5-year EPS forecasts into**
2   **perpetuity?**

3   A. In my Phase 1 testimony, I identified several other concerns with using analyst EPS growth
4   forecasts in the DCF including:[127]

- Low correlation between analysts' EPS and DPS growth forecasts, due to the much
  greater volatility of earnings relative to dividends;

- Unknown starting period for analyst growth forecasts and therefore likely inconsistency
  with the DCF model's assumed starting period, the date the dividend yield is calculated;

- Inconsistency between the CG DCF results and analysts' own implied expected return
  estimates;

- Wide disparity between analyst forecasts and utilities' long-term historical DPS growth
  rates; and

- Wide disparity in model results across proxy group members that should, in principle,
  have similar costs of equity.

15   For all of these reasons, judgment and caution should be exercised in using analysts' EPS
16   growth forecasts in DCF models. Unequivocally, analysts' EPS growth forecasts should not
17   be used as-is in the constant-growth DCF model.

18

19   **Q. Should the Commission rule out the use of the CG DCF completely?**

20   A. The CG DCF is a valid and widely used financial model, and it could, in principle, be used to
21   estimate the cost of equity. It is possible to implement the CG DCF with realistic perpetuity
22   growth assumptions, so there's no reason to prohibit its use completely. Nonetheless, its
23   input assumptions should be scrutinized for their validity over the discounting horizon and
24   economic reasonableness, and the resulting COE estimates should be benchmarked against
25   third-party, objective references.
26   More generally, discounted cash flow models can be a robust approach to estimating
27   expected returns and are widely used throughout finance. The key shortcoming of the CG
28   DCF– assuming a relatively short-term growth rate into perpetuity – can be easily remedied
29   by assuming that analysts' estimated growth rates apply only for a limited period, after which

---

[127] Exhibit PCF-01 (Ellis), p. 32-77.

1	they converge toward a market- or sector-average terminal growth rate in a multi-stage DCF
2	model (MS DCF). Despite the various deficiencies in analysts' estimates even in the short-
3	term, they are viewed as the best available estimates of near-term investor expectations. That
4	said, relatively little weight should be placed on them in estimating the cost of equity, and the
5	MS DCF can weight them more appropriately.
6	
7	
8	**VII.** **WHEN UTILIZING THE CAPM, THE COMMISSION SHOULD PROHIBIT**
9	**PARTIES FROM INCLUDING ASSUMPTIONS, DATA SOURCES, AND**
10	**MODIFICATIONS THAT LACK CONCEPTUAL OR EMPIRICAL VALIDITY.**
11	**Q. Please provide an overview of the CAPM.**
12	A. As explained in my Phase 1 direct testimony, the capital asset pricing model (CAPM),
13	expresses the COE in terms of the fundamental financial risk-reward trade-off: investors
14	demand higher returns as risk increases. The CAPM estimates the cost of equity, k, from the
15	formula:

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

17	where r_f is the risk-free rate (typically a long-term US Treasury bond), r_m is the expected
18	return on the market, and β is a measure of risk of the company in question relative to the
19	market.[128]
20	It is common practice in utility regulatory proceedings to estimate a *long-term* cost of
21	equity. This is an implicit assumption in the CG DCF. For consistency, the CAPM is
22	typically used to estimate a long-term COE. The 30-year is the longest-term Treasury and is
23	commonly used in the CAPM.
24	The market risk premium (MRP), the difference between the market return and the risk-
25	free rate, $r_m - r_f$, reflects the additional return investors require as compensation for taking
26	on equity market risk.
27	

---

[128] Exhibit PCF-01 (Ellis), p. 50-51.

1   **Q. Do you have concerns with how the CAPM is frequently implemented in utility ROR**

2   **proceedings?**

3   A. Yes. In my Phase 1 direct testimony, I identified a number of common implementation errors

4   in all three of the CAPM's assumptions, as well as in a commonly used variation on the

5   CAPM known as the Empirical CAPM (ECAPM).[129] These common errors include:

6   • Forecast, not current, risk-free rate;

7   • Uncritical acceptance and use of a single source for beta;

8   • Adjusted beta;

9   • CG DCF and/or a forecast risk-free rate to estimate a forward-looking MRP;

10   • Income-only, not total, bond returns to estimate a historical MRP;

11   • Arithmetic, not geometric, returns to estimate a historical MRP; and

12   • Empirical CAPM (ECAPM).

13   All of these common implementation practices are flawed and should be prohibited by the

14   Commission. I have developed seven specific recommendations to address each of these

15   common implementation errors.

16

17   **A.   The Commission Should Require Parties to Utilize the Current Risk-Free**

18   **Rate, Not Forecast Risk-Free Rates.**

19   **Q. What is your first recommendation, regarding the risk-free rate assumption?**

20   A. I recommend the Commission prohibit the use of a forecast risk-free rate and require the use

21   of the current rate.

22

23   **Q. What is the rationale for prohibiting use of a forecast rate?**

24   A. As explained in my Phase 1 direct testimony, I have two concerns with using a forecast

25   rate.[130] First, using a forecast rate creates inconsistencies with the time horizon of the DCF,

26   which is estimated as of the date of the dividend yield calculation. The mathematical formula

27   for the present value of a periodic time series upon which the DCF is based discounts the

28   stream of future cash flows to a "time zero" one period before the first payment. The

29   resulting discount rate is as of that time zero. The first payment in the DCF model occurs one

---

[129] Exhibit PCF-01 (Ellis), p. 51-70.
[130] Exhibit PCF-01 (Ellis), p. 51-56.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   time step from the dividend yield calculation date; therefore the rate determined by the DCF

2   model is as of that date. Using an interest rate expected at some future date in the CAPM

3   produces a COE as of that future date, so that COE is not directly comparable to the DCF's

4   COE.[131]

5   Even if we ignored the inconsistency concern and wanted to use a forecast rate anyway,

6   my second concern is that commonly available interest rate forecasts are no better predictors

7   of future interest rates than the current market rate, as explained in my Phase 1 direct

8   testimony[132] and demonstrated in Figure 15, an updated cross-plot of the 20-year Treasury

9   rate one year ahead against the current rate. Current interest rates account for approximately

10   95% of the variation in future interest rates. The current rate is also unbiased – exhibiting no

11   tendency to be systematically too high or too low.[133] For the 20-year Treasury, bias accounts

12   for less than 0.003% of forecast error. Similar predictive validity is obtained for 30-year

13   Treasury and corporate bonds.[134] In contrast, bias accounts for 48% of the BCFF's 30-year

14   Treasury year-ahead forecast error.

---

[131] Morin has argued that "given that this proceeding is to provide ROE estimates for setting electric rates going forward, forecast interest rates are far more relevant. The use of interest rate forecasts is no different than the use of projections of other financial variables in DCF analyses" (Public Service Commission of South Carolina, Docket No. 2022-254-E, Direct Testimony of Roger A. Morin for Duke Energy Carolinas, LLC, p. 40, *available at* https://dms.psc.sc.gov/Attachments/Matter/ed924365-3a5b-467d-a60c-686c22d5da63). As explained, the use of a forecast interest rate in the CAPM is actually *inconsistent* with the assumptions and results of the DCF model.

[132] Exhibit PCF-01 (Ellis), p. 54-55.

[133] The bias in a forecast can be assessed from the decomposition of the mean square error into bias, inefficiency, and random variation components. *See, e.g.*, Jacob Mincer and Victor Zarnowitz, *Economic Forecasts and Expectations: Analysis of Forecasting Behavior and Performance*, Nat'l Bureau of Econ. Rsch.(1969), p. 3-46, *available at* http://www.nber.org/chapters/c1214.

[134] The 20-year Treasury is used here because much more historical data is available.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1 **Figure 14. Twenty-year Treasury rate, one year in the future vs. current[135]**
2 January 1925-December 2023

3
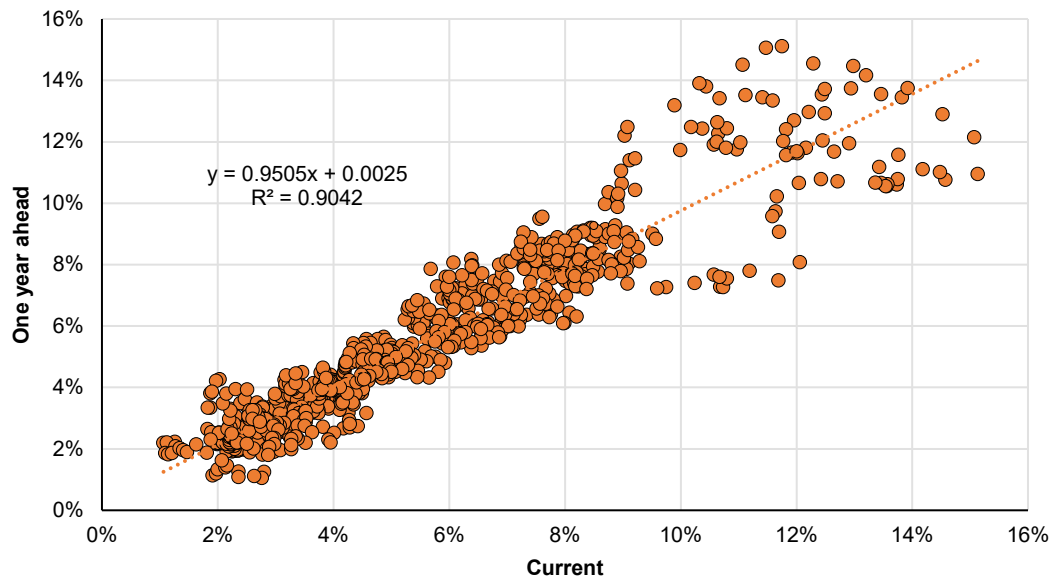
4   Most critically, I have particularly strong objections to the most commonly used source

5 for forecast interest rates, Blue Chip Financial Forecasts (BCFF).[136] As explained in my

6 Phase 1 direct testimony, BCFF's long-term Treasury forecast has a multi-decade track

7 record of upward bias.[137]

8   Current rates' high validity in predicting future rates can be explained more intuitively by

9 the market's forward-looking nature. If investors expect interest rates to rise, their

10 expectations will be incorporated into current yields. Consider the alternative. Suppose an

11 investor expects the yield on the 30-year Treasury to rise from its current ~4% to 5% over the

12 next six months. There is an inverse relationship between a bond's value and its yield; when

13 the yield rises, the value falls, and vice versa. An investor who expects bond yields to rise

14 would not buy a bond today, because to do so would be to invest expecting a loss; better not

15 to buy the bond at all. But market participants *do* buy at the current ~4%, implying that the

16 market overall does *not* expect rates to rise in the future. Current yields are the best predictor

17 of future yields, especially for longer-term bonds.

---

[135] M. Ellis analysis of Federal Reserve Economic Data (FRED) data, *available at*
https://fred.stlouisfed.org/.
[136] Sometimes also known as Blue Chip Economic Indicators.
[137] Exhibit PCF-01 (Ellis), p. 51-54.

1   Roger Morin has acknowledged the superiority of using the current rate to forecast future

2   rates: "on balance, the bond market is very efficient in that it is difficult to consistently

3   forecast interest rates with greater accuracy than a no-change [from the current interest rate]

4   model."[138]

5

6   **Q. How do utility cost of capital experts justify the use of forecasts with such a poor track**

7   **record?**

8   A. SDG&E witness Coyne cited a Massachusetts regulatory decision to argue that "Blue Chip

9   Financial Forecasts is widely relied on by investors and provides a useful proxy for investor

10   expectations for the risk-free rate."[139] Similarly, Roger Morin has argued, "the fact that

11   investors are willing to purchase such expensive services confirm [*sic*] the importance of

12   economic/financial forecasts in the minds of investors."[140]

13   These "investor reliance" and "willingness to purchase" arguments implicitly assume that

14   investors rely *only* on BCFF forecasts, to the exclusion of all other ways that investors might

15   develop their expectations; that they rely on BCFF's forecasts as-is, with no adjustment for

16   their historical inaccuracy; and that investors' only use of the forecasts is for investment

17   decisions. None of these assumptions is true.

18   BCFF may be relied upon by *some* investors, but no basis exists for Mr. Coyne's claim

19   that BCFF forecasts represent a reasonable proxy for investor expectations. BCFF has no

20   more than a hundred thousand subscribers,[141] less than 0.1% of the hundreds of millions of

21   investors who are exposed to Treasury rates through direct investments or as a benchmark for

22   other investments.[142] Although utility cost of capital experts routinely argue that these

---

[138] Morin, *New Regulatory Finance* at 172.

[139] Exhibit SDG&E-04 (Coyne), p. 38; Exhibit SCG-04 (Coyne), p. 39-40.

[140] Public Service Commission of South Carolina, Docket No. 2022-254-E, Direct Testimony of Roger
       A. Morin for Duke Energy Carolinas, LLC, p. 39, *available at*
       https://dms.psc.sc.gov/Attachments/Matter/ed924365-3a5b-467d-a60c-686c22d5da63

[141] In the 2020 annual report of Wolter Kluwers, BCFF's owner, $905 million of revenue was attributed
       to the Legal & Regulatory segment, of which BCFF is just 1 of 99 offerings. *See*
       https://www.wolterskluwer.com/en/legal/our-solutions. BCFF costs approximately $2,500/year. Even
       assuming BCFF accounts for 10% of segment revenue – roughly ten times the segment average –
       BCFF has no more than 40,000 subscribers.

[142] More than half of US adults and households are invested in the stock market. *See, e.g.*,
       https://www.pewresearch.org/fact-tank/2020/03/25/more-than-half-of-u-s-households-have-some-
       investment-in-the-stock-market/ and https://news.gallup.com/poll/266807/percentage-americans-
       owns-stock.aspx.

1   forecasts represent the "market's view," 0.1% in no way represents the market. The market

2   has tens of millions of participants responding to all kinds of information and the small slice

3   of the market that uses BCFF does not represent an adequate or reasonably proxy.

4   The consistent errors in BCFF forecasts are well-known; the Congressional Budget

5   Office has issued public reports on BCFF's interest rate forecasting errors for nearly twenty

6   years.[143] Many investors undoubtedly take BCFF's forecasts "with a grain of salt" and

7   inform their decisions with other forecasts and information. Finally, BCFF reports include

8   dozens of other forecasts, as well as commentary and analysis. Investors might "rely" on

9   BCFF's reports for that other content, not BCFF's interest rate forecasts, per se.

10   Roger Morin has additionally argued in defense of forecast interest rates that "investors

11   price securities on the basis of long-term expectations, including interest rates," "investors'

12   required returns can and do shift over time with changes in capital market conditions, hence

13   the importance of considering interest rate forecasts," and "the empirical evidence

14   demonstrates that stock prices do indeed reflect prospective financial input data." [144] It is

15   certainly true that investors price securities based on their expectations, and those

16   expectations, and therefore investors' required returns, change over time. But the truth of

17   these statements by no means requires or even implies that investors rely on third-party

18   forecasts in general, or the BCFF forecast specifically, in doing so.

19

20 **Q. What is your recommendation with respect to the risk-free rate assumption in the**

21   **CAPM?**

22 A. The high predictive validity of current interest rates, BCFF's consistently poor track record,

23   and economic intuition are consistent with an extensive body of research on the superiority of

24   simple prediction models to both more complex models and expert judgment.[145] Current

25   interest rates are the most accurate and unbiased publicly available estimates for future

---

[143] *See, e.g.,* Congressional Budget Office, *CBO's Economic Forecasting Record* (November 2002), p. 13, 18.

[144] Public Service Commission of South Carolina, Docket No. 2022-254-E, Direct Testimony of Roger A. Morin for Duke Energy Carolinas, LLC, p. 39, *available at* https://dms.psc.sc.gov/Attachments/Matter/ed924365-3a5b-467d-a60c-686c22d5da63

[145] *See, e.g.*, Daniel Kahneman, Olivier Sibony, and Cass Sunstein, *Noise: A Flaw in Human Judgment*, Hachette Book Group (2021), p. 111-147.

1   interest rates that I am aware of. Conveniently, using the current rate also entirely skirts the

2   potential concern about horizon inconsistency with the DCF.

3   I recommend that the use of interest rate forecasts – in the CAPM, cost of debt (explained

4   in Section VIII below), or anywhere else in utility regulatory proceedings – should be

5   prohibited unless it can be demonstrated that the proposed forecast has superior predictive

6   validity to the current rate.

7

8   **B.   The Commission Should Require Parties to Evaluate Multiple Sources and**
9   **Methodologies in Estimating Beta, as Opposed to Utilizing a Single Source or**
10   **Estimation Methodology.**

11   **Q. What is your second recommendation, regarding the sources of beta?**

12   A. I recommend the Commission require assessment of multiple sources of beta, each calculated

13   using different estimation methodologies, and not allow CAPM COE estimates to rely on a

14   single source or estimation methodology.

15

16   **Q. Why can't we rely on a single source for beta?**

17   A. As I explained in my Phase 1 direct testimony, beta is intended to be a *forward-looking*

18   measure of relative risk, so it is inherently uncertain.[146] It cannot be measured directly (like

19   an interest rate) and is usually estimated from *historical* data, as the slope of the regression of

20   the returns of a stock against the returns of the market over a recently-ended historical period.

21   Estimates based on historical data generally reasonably reflect future expectations, because

22   most companies' risk profiles change slowly over time. Slowly changing risk profiles prove

23   particularly true for the relatively stable and predictable utility sector.

24   In my Phase 1 direct testimony, I provided numerous examples of how seemingly slight

25   differences in methodology can yield dramatically different results. Figure 16 summarizes

26   the betas for the entire utility sector calculated under different methodologies for trailing

27   return history – 1, 2, or 5 years – and return calculation frequency – daily, weekly, or

28   monthly presented in my Phase 1 direct testimony. Beta estimates range from 0.38 to 0.77, a

29   factor of 2. Even a parameter as arbitrary as the day of the week used to calculate weekly

---

[146] Exhibit PCF-01 (Ellis), p. 57-69.

1   returns could cause beta to vary up to 57%. This wide variance highlights the need to

2   evaluate betas calculated using a number of different methodologies.

3   **Figure 15. Utility sector average beta under different calculation methodologies**[147]
4   As of May 2022

Trailing return history	Return calculation frequency		
Years	Daily	Weekly	Monthly
1	0.39	0.43	0.77
2	0.48	0.54	0.38
5	0.71	0.74	0.48
Monday		0.69	
Tuesday		0.49	
Wednesday		0.56	
Thursday		0.67	
Friday		0.77	

7   **Q. What are some reasons beta estimates can vary so much under different calculation**

8   **methodologies?**

9   A. One key reason beta estimates can vary under different calculation methodologies is a

10   dramatic, but temporary, change in the risk of the market or in individual stocks, as in the

11   pandemic-related market turmoil of early 2020. That temporary change will influence the

12   beta estimate for as long as the period of change is included in the trailing data used in the

13   beta calculation, even if investors' risk perceptions have returned to their level prior to the

14   dramatic change. Analysts should always examine whether the change in market conditions

15   was temporary or sustained.

17   **Q. How can we determine whether the change in investors' risk perceptions was**

18   **temporary or has been sustained?**

19   A. Determining whether the change in investors' risk perception was temporary or has been

20   sustained is typically done by examining how betas calculated using different amounts of

21   trailing data and returns calculated at different frequencies – for example, daily, weekly, or

22   monthly – have changed over time.

23   The 2022 off-cycle cost of capital proceeding provides a case in point. A primary Utility

24   argument was that their betas had jumped, indicative of increased investor risk perception. I

---

[147] Exhibit PCF-01 (Ellis), p. 62-66.

1   and other intervenor experts pointed out that the elevated betas cited by the Utilities were an

2   artifact of the unusual market turmoil in early 2020 and the Utilities' chosen beta calculation

3   methodology, Value Line's 5 years of trailing weekly returns with the Blume adjustment, and

4   did not reflect investors' forward-looking expectations; other beta calculation methodologies

5   produced significantly lower betas.[148]

6   Figure 17 compares the Utilities' proxy group average realized betas over the two years

7   since that proceeding to the ~0.9 used by the Utilities. Whether calculated using weekly,

8   monthly, or daily returns, realized betas are approximately one-third lower. The 5-year

9   weekly adjusted betas the Utilities relied on were not forward-looking at all.

10   **Figure 16. Utility beta comparison: recommended vs. realized[149]**

11

12
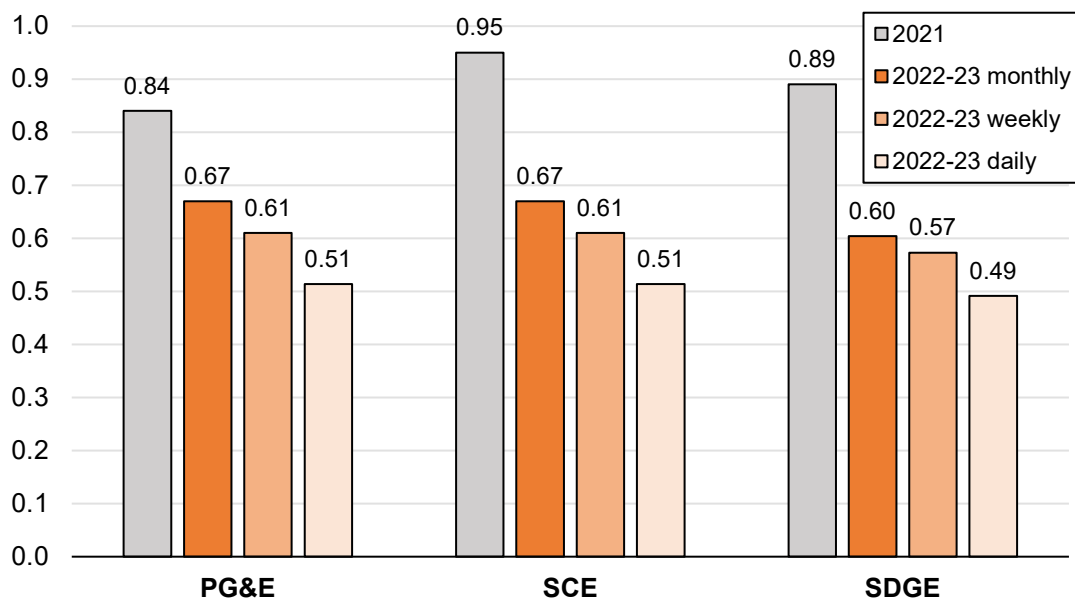
13   **Q. Is the need to estimate beta using different methodologies well known?**

14   A. Yes. Villadsen et al. discuss the trade-offs of different methodologies, highlighting the need

15   to consider shorter calculation intervals in the wake of abrupt disruptions such as was

16   experienced first during and then immediately after the pandemic-driven bout of market

17   turmoil in early 2020:

---

[148] Exhibit PCF-01 (Ellis), p. 57-59.
[149] M. Ellis analysis of FDL data, *available at*
https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html [last accessed Jan. 18, 2024].

1		The choices for the interval for the return data and the length of the beta
2		estimation window involve trade-offs between obtaining more observations
3		through the choice of a longer window and/or more frequent return data,
4		ensuring that no structural change has occurred during the estimation window,
5		and avoiding problems due to insufficient trading activity. … Balancing these
6		considerations, economists typically recommend estimating beta using daily,
7		weekly, or monthly returns over the most recent 2- to 5-year period, with
8		weekly being the more common, *except if there are reasons to think that the*
9		*industry might be subject to recent changes in systematic risk so that the use*
10		*of a more recent data window is desirable.*[150]

11　　　　The need to examine beta using different calculation methodologies is also reflected in

12　　data providers' offerings. For example, Bloomberg allows users to easily override its default

13　　beta calculation parameters. S&P GMI, in addition to reporting betas calculated using 1 and 3

14　　years of trailing data, provides its users spreadsheet models that allow them to modify all of

15　　its beta calculation parameters.

16

17　**Q. How should beta be selected?**

18　A. Any decent analyst knows to "triangulate" any subjective input assumption, like beta, by

19　　looking at a variety of sources, comparing them to long-term historical trends, and reviewing

20　　other relevant data, like company performance. At a minimum, the Commission should

21　　require cost of capital experts to evaluate at least two betas, each calculated using different

22　　methodologies, such as Yahoo! Finance/Zacks (both of which use 5 years of monthly

23　　returns), S&P, Bloomberg, or the analyst's own calculations.

24

25　　　　**C.　　The Commission Should Prohibit Use of Adjusted Beta, Which Is Not Valid**
26　　　　　　　**for Utilities.**

27　**Q. What is your third recommendation, regarding adjusted beta?**

28　A. I recommend the Commission prohibit the use of adjusted beta, which is not valid for

29　　utilities.

30

---

[150] Villadsen et al., *Risk and Return for Regulated Industries* at 73-76 (emphasis added).

1 **Q. Please explain adjusted beta.**

2 A. As explained in my Phase 1 direct testimony, "adjusted beta" refers to a mathematical

3   revision to the "raw" regression-based beta, based on an analysis conducted by Wharton

4   professor Marshall Blume in the early 1970s.[151] Analyzing beta-sorted portfolios, he found a

5   tendency for betas, on average, to regress toward the market average beta, 1.0, from one time

6   period to the next.[152] Based on this finding, some providers of beta estimates report adjusted

7   betas that are a weighted average of the raw estimate and the market beta (1.0 by definition).

8   The most common weighting is 2/3 on the raw beta, 1/3 on the market beta:[153]

9    $$\beta_{adjusted} = \frac{2}{3}\beta_{raw} + \frac{1}{3}$$

10   For stocks with raw betas below 1.0, like most utilities historically, the effect of the

11   adjustment is to increase the beta one-third of the way toward 1.0. For example, a stock with

12   a raw beta of 0.4 would have an adjusted beta of 2/3 x 0.4 + 1/3 = 0.6. For its adjusted beta,

13   Bloomberg uses the common 2/3 and 1/3 weights. Value Line's weights are similar, 0.67 and

14   0.35, respectively. Value Line also rounds to the nearest 0.05.[154]

15

16 **Q. Is beta always adjusted?**

17 A. No. As PG&E and SCE witnesses Vilbert and Villadsen have noted, "analysts have different

18   views on whether to use raw or adjusted betas,"[155] and many frequently used sources of beta

19   report only unadjusted betas, e.g., Yahoo! Finance, and Zacks, and S&P GMI. Bloomberg

20   reports both raw and adjusted betas.

21

22 **Q. Is the Blume adjustment valid for utilities?**

23 A. No, it is not. As explained in my Phase 1 direct testimony, the Blume adjustment is based on

24   an observation of the tendency of betas, *on average*, to regress toward 1.0.[156] But not every

25   stock exhibits this tendency. Blume did not investigate whether and how this tendency might

26   vary across stocks with different characteristics.

---

[151] Exhibit PCF-02 (Ellis), p. 66-68.
[152] Blume, *On the Assessment of Risk*, The Journal of Finance, 26:1 (March 1971), p. 1-10.
[153] The 2/3 and 1/3 weights are based on the regression coefficients Blume presented in his original paper, which regressed betas in one period against betas in the previous period.
[154] Value Line, *Value Line's Estimation of Beta*, based on personal correspondence (October 6, 2021).
[155] Villadsen et al., *Risk and Return for Regulated Industries* at 80.
[156] Exhibit PCF-01 (Ellis), p. 67-68.

1   Rutgers professor Richard Michelfelder investigated the validity of the beta adjustment

2   specifically for utility stocks and found no evidence of the average tendency observed by

3   Blume.[157] This can be clearly seen in Figure 18, an updated analysis of the same 7-year

4   monthly beta used by Blume in his original research, for the entire utility sector going back

5   to 1933. Since the 1950s, the beta for the utility sector as a whole has tended to regress

6   toward 0.50-0.60, not 1.0.[158] Blume used mean squared error (MSQ) to assess the accuracy

7   of his adjustment. It can be shown that the standard 2/3 and 1/3 weights increase the MSQ for

8   utility betas by approximately 45%.

---

[157] Michelfelder, Theodossiou, *Public Utility Beta Adjustment and Biased Costs of Capital in Public Utility Rate Proceedings*, The Electricity Journal, 29:9 (November 2013), p. 60-68.

[158] One might ask whether the utility sector average reflects the tendency of individual utility stocks. Betas are additive, so a tendency for individual utility stocks to regress toward 1.0, on average, would be reflected in the industry beta. Blume used the same logic to extrapolate from the portfolios he analyzed to individual stocks. *See* Fama, French, *The Capital Asset Pricing Model: Theory and Evidence*, Journal of Economic Perspectives, 18: 3 (Summer 2004), p. 31.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1 **Figure 17. Utility sector 7-year monthly raw beta[159]**
2 June 1933-November 2023

3
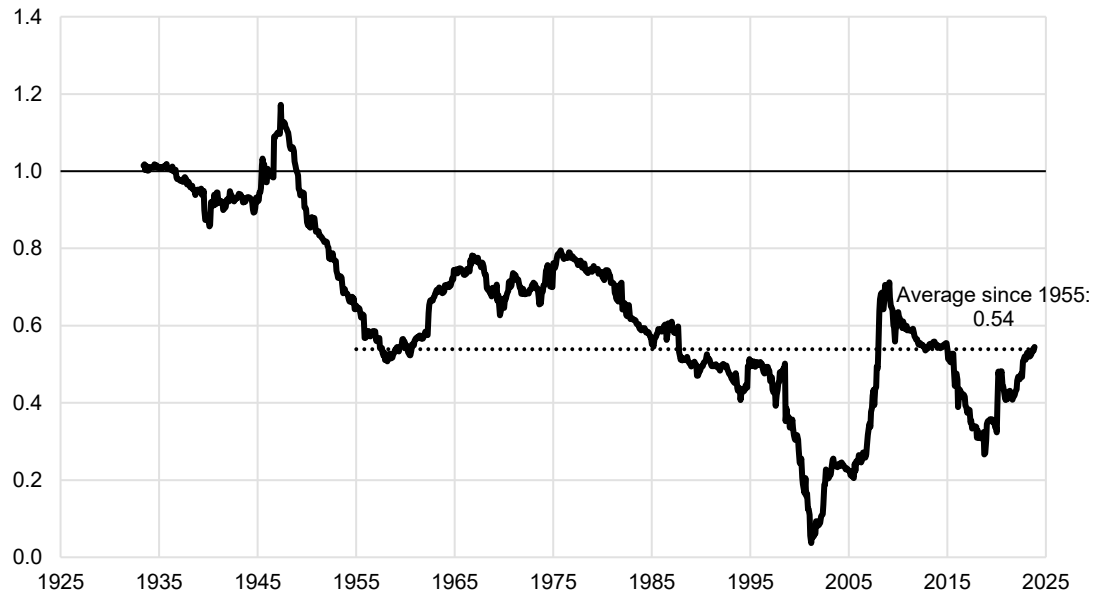
4   Blume speculated as to why betas, on average, tend to regress toward 1.0 over time.[160]

5   High-beta firms tend to be newer and smaller; as they mature and grow, they become more

6   risk-averse. In contrast, low-beta firms tend to run out of low-risk investment opportunities

7   and must accept more risk to stay in business. Neither of these causal explanations applies to

8   utility operating companies, like SDG&E and the publicly traded members of its proxy

9   group. They are large and mature, and their investments tend to have consistently low risk

10   profiles over time. These attributes combine to keep utilities' betas sustainably and

11   significantly below 1.0.

12

13 **Q. Utility cost of capital experts often argue that we can nonetheless rely on Value Line,**

14   **which reports only adjusted beta, because it is widely used by investors. Do you agree**

15   **with this reasoning?**

16 A. Morin has asserted, "Value Line is the largest and most widely circulated independent

17   investment advisory service, and influences the expectations of a large number of

---

[159] Market capitalization-weighted average of all NYSE-, AMEX-, or NASDAQ-listed utilities. M. Ellis
analysis of FDL data, *available at*
https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html [last accessed Jan. 18,
2024].
[160] Blume, *Betas and Their Regression Tendencies*, The Journal of Finance, 30:3 (June 1975), p. 785-
795.

1   institutional and individual investors."[161] This is similar to the purported rationale for using

2   forecast interest rates described in Section VII.A above, and the same counterarguments

3   apply.

4   The argument against relying on Value Line is even stronger, though, as other sources of

5   beta are *much* more popular. Website visitor data, easily obtained from a simple internet

6   search, belie Morin's claims about Value Line's reach and influence. As seen in the

7   screenshots in Figure 19, the websites of Yahoo! Finance and Zacks, two sources of free beta

8   estimates, have more than 1,200 and 18 times as many visitors, respectively, as Value

9   Line.[162]

---

[161] Morin, *New Regulatory Finance* at 71.
[162] Similarweb.com [last accessed Jul. 11, 2023].

Figure 18. Value Line, Yahoo! Finance, and Zacks website visitor data
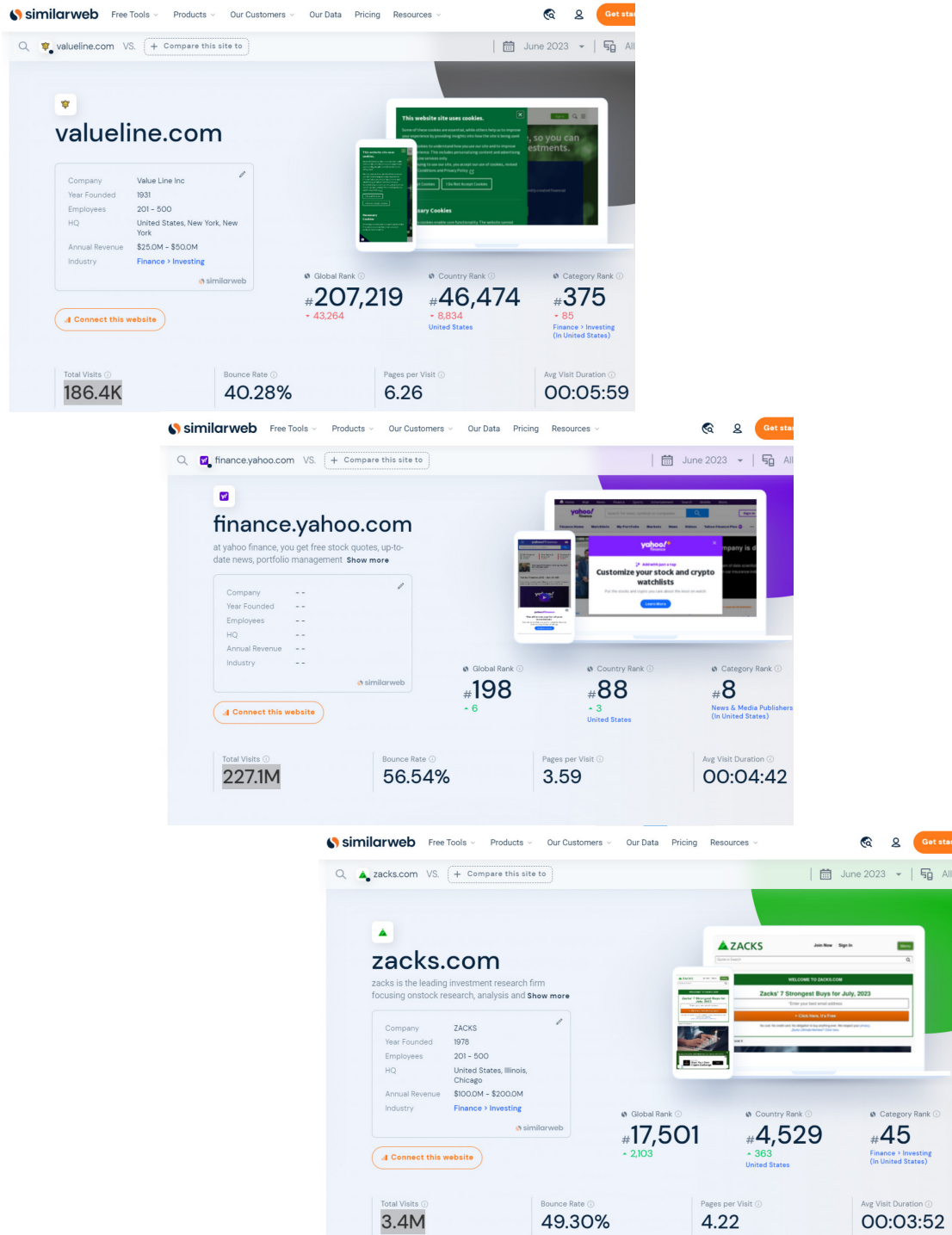
1   **Q. Does the prohibition on adjusted beta preclude consideration of Value Line or other**

2   **sources of adjusted beta?**

3   A. No. Value Line and other adjusted betas can be easily "unadjusted" with a simple

4   mathematical calculation:

5 $$\beta_{unadjusted} = \frac{3}{2}(\beta_{adjusted} - \frac{1}{3})$$

6

7   **Q. What is your recommendation with respect to the use of adjusted beta in the CAPM for**

8   **estimating utilities' cost of equity?**

9   A. Empirical analysis specifically investigating utility betas, grounded in sound economic

10   reasoning, demonstrates that utility betas do not exhibit a tendency to regress toward the

11   market average and therefore should not be Blume-adjusted. The Commission should

12   prohibit the use of adjusted betas in implementations of the CAPM for estimating utilities'

13   cost of equity.

14

15   **D.**   **The Commission Should Prohibit the Constant Growth DCF Using Analyst**
16   **Growth Forecasts and Forecast Risk-Free Rates in Calculating a Forward-**
17   **Looking MRP.**

18   **Q. The next three errors you identified are related to the market risk premium for the**

19   **CAPM. Please explain how the MRP is calculated.**

20   A. The market risk premium is generally calculated by separately estimating the market return

21   and the long-term risk-free rate and taking the difference. Two different estimates are

22   commonly used: the long-term historical average and a forward-looking estimate based on

23   current market prices.

24

25   **Q. What is your fourth recommendation, regarding the calculation of a forward-looking**

26   **MRP?**

27   A. I recommend the Commission prohibit estimating the expected market return with the CG

28   DCF assuming analysts' growth forecasts into perpetuity or with a forecast risk-free rate.

29

1   **Q. Please explain the rationale for your fourth recommendation.**

2   A. To estimate the forward-looking market return for the MRP, utility cost of capital experts

3   often use one or more analysts' 3-to-5-year EPS growth forecasts in the CG DCF.[163] As

4   explained in Section VI above, extrapolating these relatively short-term analyst EPS growth

5   forecasts into perpetuity, as the CG DCF does, leads to economically absurd results.

6   The invalidity of these analyst forecasts beyond their explicit, relatively short-term

7   forecast horizon is well-known in the finance community. None of the independent

8   investment firms whose published CMAs I periodically survey estimates their market return

9   forecast using analyst estimates extrapolated into perpetuity. This explains why their market

10 return forecasts, at most 8.3%, are systematically far lower than witness Coyne's CG DCF

11 estimate of 16%.[164]

12   MRPs based on the CG DCF using analyst EPS growth forecasts should be prohibited.

13

14 **Q. Given your critique of interest rate forecasts, the forward-looking MRP should be**

15 **calculated using a current, not forecast, long-term risk-free rate. Correct?**

16 A. Correct.

17

18   **E.**   **The Commission Should Require Parties to Use the Total, Not Income-Only,**
19   **Bond Return in Calculating a Historical MRP.**

20 **Q. Please explain the historical MRP, to which the fifth and sixth errors you identified are**

21 **related.**

22 A. In principle, the MRP should be forward-looking, because the authorized rate of return

23 should reflect the market cost of capital, i.e., the *expected* return. When a forward-looking

24 financial variable, like the MRP, is difficult to estimate with precision, it is common to

25 estimate it from its long-term historical value, sometimes adjusting for relatively easily

26 quantified factors like inflation. The historical MRP is calculated as the difference in long-

27 term historical *average realized total returns* on the market and long-term Treasurys.

---

[163] Analysts take a variety of approaches to implementing the CG DCF to estimate the expected market
return. One approach is to use a forecast for the market as a whole, such as that available from S&P.
Another approach is to use forecasts for the individual companies in a broad market index and take a
weighted average of either their growth rates or their expected returns.

[164] Exhibit SDG&E-04 (Coyne), p. 40.

1 **Q. What is your fifth recommendation, regarding the calculation of a historical MRP?**

2 A. I recommend the Commission require estimating the historical risk-free rate using total, not

3 income-only, bond returns. A common error in estimating the historical MRP is to use the

4 income-only return, but doing so is conceptually flawed.

5

6 **Q Why must the total bond return be used, and not the income-only return?**

7 A. The rationale for using the income-only return is that it reflects investor expectations. This

8 argument is conceptually flawed; it is inconsistent with the entire premise of estimating

9 investor expectations from historical *realized* returns. In addition, it does not reflect any

10 actual return investors can achieve except in the rare cases where the investor buys a long-

11 term Treasury at issuance and holds it for two to three decades until maturity. For these

12 reasons, the total bond return, not the income-only return, should be used in calculating the

13 historical MRP.

14

15 **Q What is the difference between the total and income-only bond returns?**

16 A. The total return on any financial asset has two components, periodic cash flows like interest

17 on bonds or dividends from stocks, and changes in the value of the asset over time, i.e.,

18 capital gains or losses.

19

20 **Q Why do some cost of capital experts use the income-only bond return?**

21 A. In calculating the average historical return on long-term Treasurys, some utility cost of

22 capital experts use only the income component, essentially the average of the historical

23 interest rates.[165] Their rationale is that the interest rate reflects investors' expected return at

24 the time they purchase the bond.

25

26 **Q. What is wrong with using the income-only return?**

27 A. This argument is flawed for three reasons. First, the historical MRP is the difference in long-

28 term historical *realized*, not expected, returns. Recall, we are using the historical MRP

---

[165] *See, e.g.*, Exhibit SCE-02 (Villadsen), p. 36: "One commonly used method for estimating the MRP is to measure the historical average premium of market returns over the income returns on government bonds over a long historical period."

1   precisely because it is difficult to estimate investors' *expected* market return; the long-term

2   historical market return is deemed the next best alternative. The income component of the

3   total bond return may reflect investors' historical return expectations for bonds, but no

4   corresponding data are available for investors' historical return expectations for the

5   market.[166] *Expected* Treasury returns are not comparable to *realized* market returns.

6   Second, changes in Treasury rates reflect broader changes in the cost of capital for all

7   financial assets, including stocks. If we remove the capital-gain component arising from

8   changes in interest rates from total Treasury return, we'd have to remove the capital-gain

9   component arising from changes in interest rates from the total market return as well. This is

10   not done, though, and the total market return, which reflects the capital-gain effects of

11   interest rate changes, is not comparable to the income-only Treasury return, which does not.

12   Third, to achieve a return equal to the income-only component of a long-term Treasury

13   return would require buying it at issuance and holding it to maturity. Most investors do not

14   hold Treasurys to maturity, so this is not a realistic assumption in estimating investors' actual

15   realized returns. It also is not comparable to how the realized market return is calculated, as

16   the average one-year return, not the average of the annualized 20- or 30-year returns that

17   would be comparable to the hold-to-maturity, income-only return on long-term Treasurys.

18   The Treasury return comparable to the yearly returns used to estimate the average market

19   return is comprised of one year of interest plus any capital gain or loss over the year. There is

20   no costless way for an investor to lock-in just the interest component of the total bond

21   return.[167]

22

23   **Q. Is the difference between the total return and income-only return significant?**

24   A. The capital gain or loss component of the return arises from changes in interest rates. When

25   interest rates fall, the value of outstanding bonds rises, and vice versa. The longer the life of

26   the bond, e.g., 30 vs. 5 years, the more sensitive it is to changes in interest rates.

---

[166] Researchers have concluded, though, that realized returns, on average, do *not* reflect investors' historical expectations. A robust academic research literature has concluded that actual returns on equities substantially exceeded investor expectations during most of the twentieth century, a widely recognized phenomenon known as the equity premium puzzle. *See, e.g.*, Wikipedia, *Equity Premium Puzzle*, *access at* https://en.wikipedia.org/wiki/Equity_premium_puzzle [last accessed July 8, 2023].

[167] Locking-in the one-year return would be equivalent to buying a one-year Treasury bill, with its corresponding, typically lower, interest rate.

1   As seen in Figure 20, interest rates have fluctuated quite a bit over time, so we might

2   think the capital gains and losses cancel each out, and the average total return would be

3   roughly equal to the average income-only return.

4   **Figure 19. Monthly average 20-year Treasury yield[168]**
5   January 1925-December 2023

6

7   This is not the case, though. Figure 21 summarizes the average total and income-only returns

8   on the 20-year Treasury since 1925. Depending on the averaging methodology, arithmetic or

9   geometric, which I will discuss below, the total return varies by up to 0.31% from the

10   income-only return.

11   **Figure 20. Average annual total and income-only 20-year Treasury returns**
12   1925-2023, percent

Return	Arithmetic	Geometric
Total	5.40	4.90
Income only	5.09	5.05
Total – income only	0.31	-0.15

13

---

[168] M. Ellis analysis of FRED data, *available at* https://fred.stlouisfed.org/; NBER data, *available at* https://www.nber.org/research/data?page=1&perPage=50.

1   **F.   The Commission Should Require Parties to Use Geometric, Not Arithmetic,**
2   **Returns, in Calculating a Historical MRP.**

3   Q. **What is your sixth recommendation, also regarding the calculation of a historical**
4   **MRP?**

5   A. I recommend the Commission require the use of geometric, not arithmetic, returns in

6   calculating both the historical market and risk-free bond returns used to estimate the

7   historical MRP.

8

9   Q. **What is the difference between arithmetic and geometric returns?**

10 A. When analyzing investment returns, two different types of average are commonly reported:

11   *arithmetic* and *geometric*. The arithmetic average return is the simple, unweighted average of

12   a series of returns across multiple historical holding periods (e.g., the average of monthly or

13   annual returns over multiple years). It is calculated as:

14
$$\frac{r_1 + r_2 + \cdots + r_n}{n}$$

15   The geometric average is the fixed annual rate of return that, if compounded every year,

16   would produce the same value as compounding the series of returns in question. It is

17   calculated as:

18
$$\sqrt[n]{(1 + r_1)(1 + r_2) \cdots (1 + r_n)} - 1$$

19   A simple example illustrates the difference. Suppose a stock price increases by 50% in

20   one year, then declines by 50% the following year, such that the ending value is 75% of the

21   starting value. The arithmetic average is 0%, (+50% – 50%)/2, while the geometric average

22   is -13.3%, $[(1 + 50\%) \times (1 - 50\%)]^{1/2} - 1$.

23   Returns can be reported on either basis, depending on the context, but investors are not

24   indifferent between them. Investors care most about changes in asset values over time, and

25   only the geometric return provides an unambiguous indicator of this change. Given a starting

26   investment value, for any geometric return there is a single future value, but for any

27   arithmetic return there are an infinite number of potential future values. If the geometric

28   average return is 5%, for example, in two years the value will be 1.05 x 1.05 – 1 = 1.1025. In

29   contrast, if the arithmetic return is 5%, in two years the value could be anywhere from 0, (1 +

30   110%) x (1 – 100%), to 1.1025 if the return is the same 5% in each year. The arithmetic

1   return, on its own, does not indicate the future value and, unless it does not vary from year to

2   year, systematically overstates it.

3   It should also be noted that the DCF model yields a *geometric* average return, i.e., the

4   fixed annual rate of return on the initial price that, if compounded every year, would have the

5   same value over time as the sum of the DCF model's past and future streams of dividends,

6   compounded (past) and discounted (future) at the same rate. For comparability, the CAPM

7   should also produce a geometric average return.

8   For these reasons, geometric returns are generally considered a better measure of investor

9   long-term expectations.

10

11 **Q. Why is the difference important in the context of the historical MRP?**

12 A. The difference between arithmetic and geometric is important in the context of the MRP

13 because the two averaging methods produce materially different results. Figure 22 shows the

14 calculation of the historical MRP under each methodology. The geometric MRP is 1.07%

15 lower than the arithmetic.

16   **Figure 21. Arithmetic and geometric historical MRP[169]**
17   July 1926-December 2023, percent

Total return	Arithmetic	Geometric	Arithmetic – geometric
Market	11.35	10.08	1.27
Long-term Treasury	5.07	4.87	0.20
MRP	6.28	5.21	1.07

18

19

20 **Q. If geometric returns better reflect long-term investor expectations, why do some cost of**

21 **capital experts use the arithmetic mean?**

22 A. The choice between arithmetic and geometric returns for estimating investor expectations has

23 been hotly debated among academics and practitioners for decades. Some of the

24 disagreement arises from differences in potential application. For example, in portfolio

25 management, where Monte Carlo simulation is common, arithmetic averages, in combination

26 with return distributions, are appropriate. In corporate finance and valuation, which is more

---

[169] M. Ellis analysis of FRED data, *available at* https://fred.stlouisfed.org/; NBER data, *available at* https://www.nber.org/research/data?page=1&perPage=50.

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1 analogous to our objective, the choice depends on the life of the investment under

2 consideration. The widely used finance text *Valuation* summarizes the current status:

3   The choice of averaging methodology will affect the results. For instance,
4   between 1900 and 2014, U.S. stocks outperformed long-term government
5   bonds by 6.4 percent per year when averaged arithmetically. Using a
6   geometric average, the number drops to 4.2 percent. This difference is not
7   random; arithmetic averages always exceed geometric averages when returns
8   are volatile.

10   So which averaging method on historical data best estimates the expected rate
11   of return? Well-accepted statistical principles dictate that the best unbiased
12   estimator of the mean (expectation) for any random variable is the arithmetic
13   average. Therefore, to determine a security's expected return for one period,
14   the best unbiased predictor is the arithmetic average of many one-period
15   returns. A one-period risk premium, however, can't value a company with
16   many years of cash flow. *Instead, long-dated cash flows must be discounted*
17   *using a compounded rate of return. But when compounded, the arithmetic*
18   *average will generate a discount factor that is biased upward (too high).*

20   There are two reasons why compounding the historical arithmetic average
21   leads to a biased discount factor. First, the arithmetic average may be
22   measured with error. Although this estimation error will not affect a one-
23   period forecast (the error has an expectation of zero), squaring the estimate (as
24   you do in compounding) in effect squares the measurement error, causing the
25   error to be positive. This positive error leads to a multiyear expected return
26   that is too high. Second, a number of researchers have argued that stock
27   market returns are negatively autocorrelated over time. If positive returns are
28   typically followed by negative returns (and vice versa), then squaring the
29   average will lead to a discount factor that overestimates the actual two-period
30   return, again causing an upward bias.[170]

31   *Valuation* goes on to recommend a widely used weighted average of the geometric and

32 arithmetic averages, weighted more heavily toward arithmetic for short-lived investments,

33 converging toward the geometric average if the investment life equals or exceeds the

34 duration of the historical time series from which the averages are calculated.

35   NYU finance professor Aswath Damodaran, known for his simple, practical advice to

36 practitioners, reaches a similar conclusion:

---

[170] Tim Koller et al., *Valuation*, McKinsey & Co. at 852-853 (6th ed. 2015) (emphasis added).

As we move to longer time horizons, and as returns become more serially
correlated (and empirical evidence suggests that they are), it is far better to use
the geometric risk premium. In particular, when we use the risk premium to
estimate the cost of equity to discount a cash flow in ten years, the single
period in the CAPM is really ten years, and the appropriate returns are defined
in geometric terms. In summary, … the geometric mean is more appropriate if
you are using the Treasury bond rate as your risk-free rate, have a long-time
horizon, and want to estimate the expected return over that long time
horizon.[171]

Despite these recommendations from well-known and highly regarded sources, some
utility cost of capital experts nonetheless calculate the MRP using arithmetic average
returns.[172] Some have objected that stock returns are not negatively autocorrelated over time,
as argued in *Valuation*,[173] but this assertion is disproven by the data. Multi-year stock returns
are strongly negatively autocorrelated from one period to the next. Figure 23 shows the
autocorrelation of annual stock market returns from 1927 through 2023, as a function of the
return calculation period, replicating and updating an academic study of long-term
autocorrelation in stock market returns.[174] For return calculation periods of 14 to 20 years,
the negative autocorrelation of returns is statistically significant at the $p=0.05$ level.[175] Over
the long term, periods of high returns do, in fact, follow periods of low returns, and vice

---

[171] Aswath Damodaran, *Discussion Issues and Derivations*,
http://people.stern.nyu.edu/adamodar/New_Home_Page/AppldCF/derivn/ch4deriv.html [last visited July 18, 2023].

[172] *See, e.g.*, Exhibit SCE-02 (Villadsen), p. 40 ("The MRP is the long-term historical arithmetic average of annual realized premiums of U.S. stock market returns over long-term (approximately 20-year maturity) Treasury bond income returns …").

[173] See, e.g., Application of Duke Energy Progress, LLC for Adjustment of Rates, Docket No. E-2, Sub 1300, Hearing Transcript (Vol. 8), p. 301 (Duke Energy - Morin) (May 4, 2023).

[174] M. Ellis analysis of FDL data, *available at*
https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html [last accessed Jan. 18, 2024]; BLS data, *available at* https://www.bls.gov/data/ [last visited January 18, 2024]. Autocorrelation is adjusted for small-sample bias, as described in Valeriy Zakamulin, *Secular Mean Reversion and Long-Run Predictability of the Stock Market*, 69:4 Bull. of Econ. Rsch. (2017), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2209048.

[175] P-value is the probability of obtaining results at least as extreme as those observed assuming the null hypothesis – here, that returns *are not* autocorrelated – is correct. The lower the p-value, the stronger the evidence in favor of the alternative hypothesis – here, that returns *are* autocorrelated. A p-value less than 0.05 means there is less than a 5% chance that the null hypothesis is true and the observed results occurred by chance. A p-value less than 0.05 is generally considered statistically significant. *See, e.g., P-Value: What It Is, How to Calculate It, and Why It Matters*, https://www.investopedia.com/terms/p/p-value.asp [last visited Jul. 16, 2023].

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1   versa, so the arithmetic average is upwardly biased, as Koller et al. explain, and the historical

2   geometric is the correct average to use as Koller et al. and Damodaran recommend.

3   **Figure 22. Autocorrelation of annual stock market returns as a function of return**
4   **calculation period[176]**
5   1927-2023
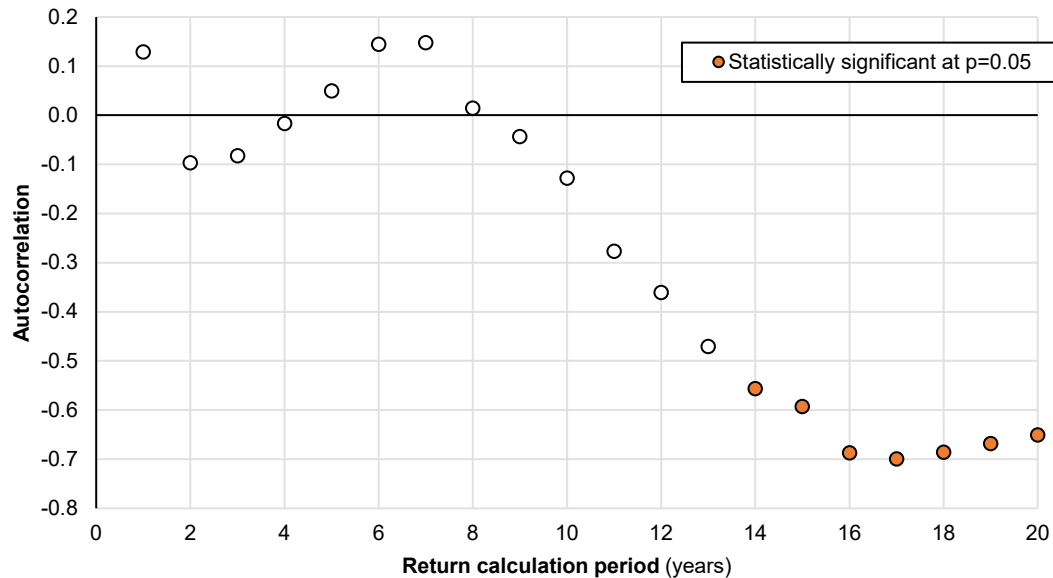
6

7

8   **G.**   **The Commission Should Prohibit Parties from Utilizing the Empirical**
9   **CAPM.**

10 **Q. What is your seventh recommendation, regarding the Empirical CAPM?**

11 A.   I recommend the Commission prohibit the use of the Empirical CAPM (ECAPM). The

12   ECAPM is not endorsed by any independent research or textbooks and is based on an invalid

13   application of academic research. When the relevant research studies are appropriately

14   adjusted for the purpose of estimating long-term utility COC, the original research findings

15   disappear.

16

---

[176] Market capitalization-weighted average return of all NYSE-, AMEX-, or NASDAQ-listed utilities, adjusted for inflation. M. Ellis analysis of FDL data, *available at* https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html [last accessed Jan. 18, 2024]; BLS data, *available at* https://www.bls.gov/data/.

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| 1 | **Q.** | **Please provide an overview of the ECAPM.** |

| 2 | A. | The ECAPM is a modification of the traditional CAPM. It is based on an empirical

| 3 | | observation in various historical academic studies that low-beta stocks tended to perform

| 4 | | better than predicted by the CAPM, and high-beta stocks worse, resulting in a "flattened"

| 5 | | security market line (SML), the relationship between beta and return. To adjust for this

| 6 | | flattened relationship, some cost of capital experts, including PG&E witness Vilbert and SCE

| 7 | | witness Villadsen, adjust the CAPM as follows:[177]

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

9 Roger Morin uses a different modification: [178]

$$k = r_f + 0.75\beta(r_m - r_f) + 0.25(r_m - r_f)$$

11 Mathematically, the effect of both versions of the Empirical CAPM is similar to the Blume

12 beta adjustment, equivalent to adjusting beta toward 1.0.

13

14 **Q. Is the ECAPM widely used?**

15 A. The ECAPM is used only in utility cost of capital proceedings, particularly by experts

16 testifying on behalf of utilities. No papers validating or endorsing the ECAPM have been

17 published in any peer-reviewed journals, and it is not included in commonly used finance

18 textbooks for students and corporate finance professionals. The papers commonly cited in

19 support of the ECAPM discuss only the empirical observation of the security market line's

20 (SML) flatness; they do not propose or validate the ECAPM itself. The ECAPM is

21 mentioned only in utility-focused practitioner guides, most notably Morin's and witnesses

22 Villadsen and Vilbert's own books.[179]

23

24 **Q. Is the ECAPM valid for estimating the cost of equity for a utility?**

25 A. The ECAPM is not valid for estimating the cost of equity for a utility, because the

26 assumptions and data used in the academic studies on which it is based are not analogous to

---

[177] *See, e.g.*, Exhibit SCE-02 (Villadsen), p. 38-39.
[178] Morin, *New Regulatory Finance* at 189-192.
[179] Morin, *New Regulatory Finance* at 189-192; Villadsen, *Risk and Return for Regulated Industries* at 82-85.

1   how the CAPM is implemented in utility cost of capital proceedings. There are two important

2   differences.

3   First, the academic studies Morin and Villadsen et al. cite in support of the ECAPM all

4   use a short-term risk-free rate; utility COC CAPMs typically use a long-term risk-free rate.

5   Using a long-term rate implicitly flattens the SML – the risk-free rate is higher, while the

6   market return is unchanged. Because the ECAPM is based on the observation of a flattened

7   slope relative to a short-term rate, it over-compensates.[180]

8   Second, the academic studies cited in support of the ECAPM do not examine utilities

9   specifically. As observed with beta, utilities' regulatory model can affect the behavior of

10   their equity returns relative to the market. In addition, the academic studies Morin and

11   Villadsen et al. cite in support of the ECAPM are all at least 20 years out of date. The most

12   recent study was published in 2004, based on data through 2003.[181]

13   When analyses in the papers cited in support of the ECAPM are re-run using a long-term

14   risk-free rate and more recent data, the "flatness" in the SML largely disappears for the

15   market as a whole, and completely disappears for utilities. Figure 24 shows the well-known

16   Fama-French (FF) analysis that is frequently cited in support of the ECAPM.[182] The FF

17   analysis regresses the monthly annualized absolute returns of beta-sorted portfolios against

18   realized beta.[183] Overlaying it is a replication using the 30-year Treasury instead of the

19   original study's 1-month T-bill and adding the utility index. The data span nearly 39 years

20   from January 1985 through November 2023. While the beta-sorted portfolios lie slightly

21   above the SML, their regression slope and intercept coefficients are not statistically

---

[180] In substituting a long-term Treasury for a short-term risk-free rate, as is typically done in utility cost of capital analyses, analysts are implicitly adopting the zero-beta CAPM developed by Fisher Black, co-creator of the Nobel Prize winning Black-Scholes option pricing equation. This more general version of the CAPM does not require the existence of a risk-free rate (over the long term, the short-term rate is not risk-free, as investors are exposed to inflation and reinvestment risk; the long-term rate is subject to inflation if held to maturity and capital gains or losses due to interest rate changes if not), just an investable asset or portfolio with a beta equal to zero. Long-term government bonds meet this criterion.

[181] Morin, *New Regulatory Finance* at 222; Exhibit SCE-02 (Villadsen), Appendix B, p. 10.

[182] Eugene F. Fama & Kenneth R. French, *The Capital Asset Pricing Model: Theory and Evidence*, 18:3 J. of Econ. Perspectives at 25-46 (2004), https://pubs.aeaweb.org/doi/pdfplus/10.1257/0895330042162430.

[183] In the replication, realized betas are calculated using excess returns, per the specification of the CAPM model, $k = r_f + \beta(r_m - r_f) + \varepsilon$.

1 significantly different than the SML's (t-statistics of -0.05 and 0.55, respectively).[184] Utilities

2 are also not statistically significantly different than the SML's prediction (t-statistic of 0.11).

3 **Figure 23. Original Fama-French absolute return analysis and replication using 30-year**
4 **Treasury[185]**

Average Annualized Monthly Return versus Beta for Value Weight Portfolios
Formed on Prior Beta, 1928–2003
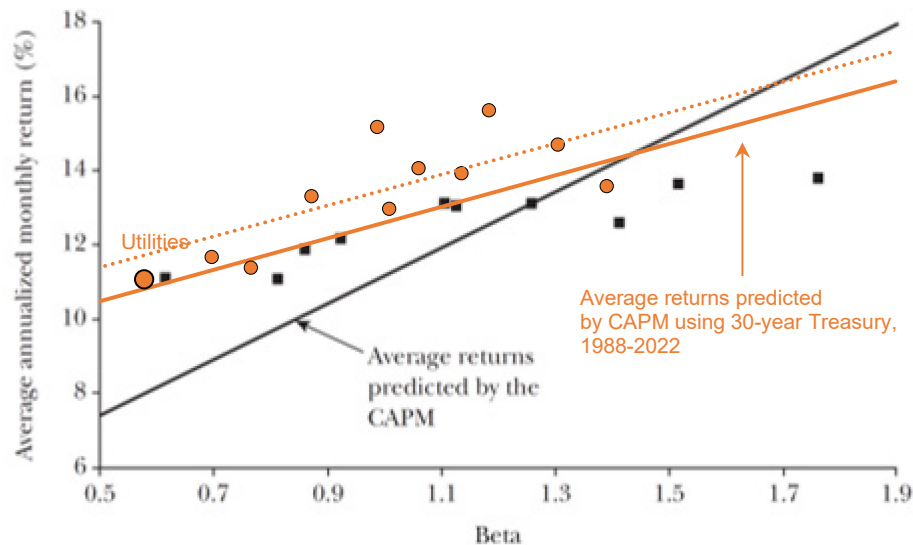
5

6 Another classic test of the CAPM that is frequently cited in support of the ECAPM

7 comes from Black, Jensen, and Scholes (BJS).[186] They regress monthly *excess* returns – the

8 return on the asset in question minus the return on the zero-beta asset – against beta, as seen

9 in Figure 25. The original BJS regression returned an intercept and slope statistically

10 significantly different from the SML's, as seen in the solid (regression) and dotted (SML)

11 black lines in Figure 25. When the BJS analysis is updated and excess returns calculated

---

[184] The t-statistic is the ratio of the departure of the estimated value of a parameter from its hypothesized value to its standard error. In regression models, t-statistics above 2.0 suggest the null hypothesis – here, that the regression slope and intercept are equal to the SML's – is not valid. The t-statistics of the replicated Fama-French analysis are both well below 2.0, indicating that the regression line of the portfolios against their betas is not statistically different than the SML.

[185] Eugene F. Fama & Kenneth R. French, *The Capital Asset Pricing Model: Theory and Evidence*, 18:3 J. of Econ. Perspectives at 33 (2004), https://pubs.aeaweb.org/doi/pdfplus/10.1257/0895330042162430; M. Ellis analysis of FDL data, *available at* https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html [last accessed Jan. 18, 2024].

[186] Michael C. Jensen, Fischer Black, and Myron S. Scholes, *The Capital Asset Pricing Model: Some Empirical Tests*, Studies in the Theory of Capital Markets, Praeger Publishers Inc. (1972), https://ssrn.com/abstract=908569.

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1   relative to the 30-year Treasury, the regression of the returns of the beta-sorted portfolios

2   against beta (the solid orange line in Figure 25) are not significantly different from the SML

3   (the dotted orange line in Figure 25).[187] As with the Fama-French analysis, utilities are also

4   not statistically significantly different than the SML's prediction (t-statistic of 0.10).

---

[187] Intercept t-statistic (H_0: 0): 0.61, slope t-statistic (H_0: SML slope): -0.10; comparable values for BJS
      are 6.52 and 6.53, respectively.

1   **Figure 24. Original BJS excess return analysis and replication using 30-year**
2   **Treasury**[188]

1931-1965

Intercept = 0.00359
Std. Err.= 0.00055
Slope   = 0.01080
Std. Err.= 0.00052

1985-2023
Intercept = 0.00078
Std. Err. = 0.00128
Slope   = 0.00311
Std. Err. = 0.00120

Utilities

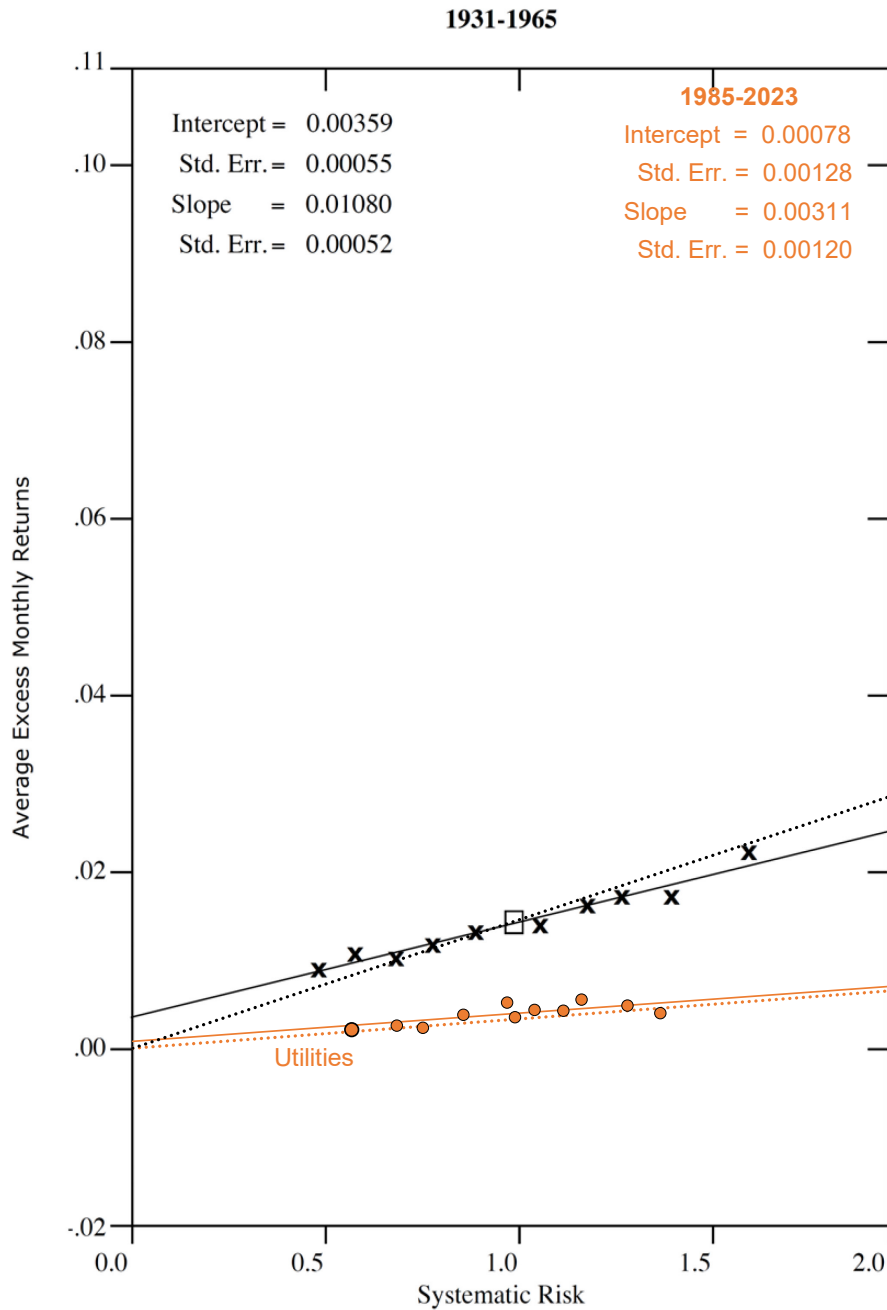Average Excess Monthly Returns

Systematic Risk

Figure 1 Average excess monthly returns versus systematic risk for the 35-year
period 1931-65 for each of ten portfolios (denoted by ×) and the market portfolio
(denoted by ☐).

3

4

1   **Q. What is your recommendation regarding the ECAPM?**

2   A. The ECAPM is not used outside utility cost of capital proceedings and cannot be found in

3   widely used finance texts. It is based on a misapplication of the academic research, which

4   uses a short-term risk-free rate and does not examine utilities specifically. The findings of the

5   original academic research cannot simply be "cut-and-pasted" into the utility cost of capital

6   context.

7   When the analyses cited in support of the ECAPM are revised to reflect the context of

8   utility cost of capital proceedings in which it is commonly applied – utility equity returns in

9   excess of the return on the long-term Treasury – the purported "flatness" in the security

10   market line disappears for both the market as a whole and specifically for utilities. Despite its

11   name, the empirical data do not support the ECAPM's modifications to the traditional CAPM

12   for use in estimating the cost of equity in utility regulatory proceedings. The Commission

13   should prohibit the use of the ECAPM in determining the cost of equity.

14

15

16   **VIII.   THE COMMISSION SHOULD INVESTIGATE THE CAUSES OF THE**
17   **UTILITIES' PERSISTENT COST OF DEBT OVER-COLLECTION SO THAT IT**
18   **MAY IMPLEMENT MEANINGFUL MEASURES TO MINIMIZE IT.**

19   **A.   The Utilities Have Persistently Over-Collected Their Cost of Debt.**

20   **Q. Are the Utilities' embedded cost of debt estimates accurate?**

21   A. No. As described in my Phase 1 testimony and seen in Figure 26, SDG&E and SoCalGas

22   systematically have over-collected the cost of debt from customers for over a decade.[189]

---

[188] Michael C. Jensen, Fischer Black, and Myron S. Scholes, *The Capital Asset Pricing Model: Some Empirical Tests*, Studies in the Theory of Capital Markets, Praeger Publishers Inc. at 21 (1972), https://ssrn.com/abstract=908569; M. Ellis analysis of FDL data, *available at* https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html [last accessed Jan. 18, 2024].

[189] Exhibit PCF-01 (Ellis), p. 31-32.

1 **Figure 25. SDG&E and SoCalGas embedded cost of debt minus actual cost of debt[190]**

2

3
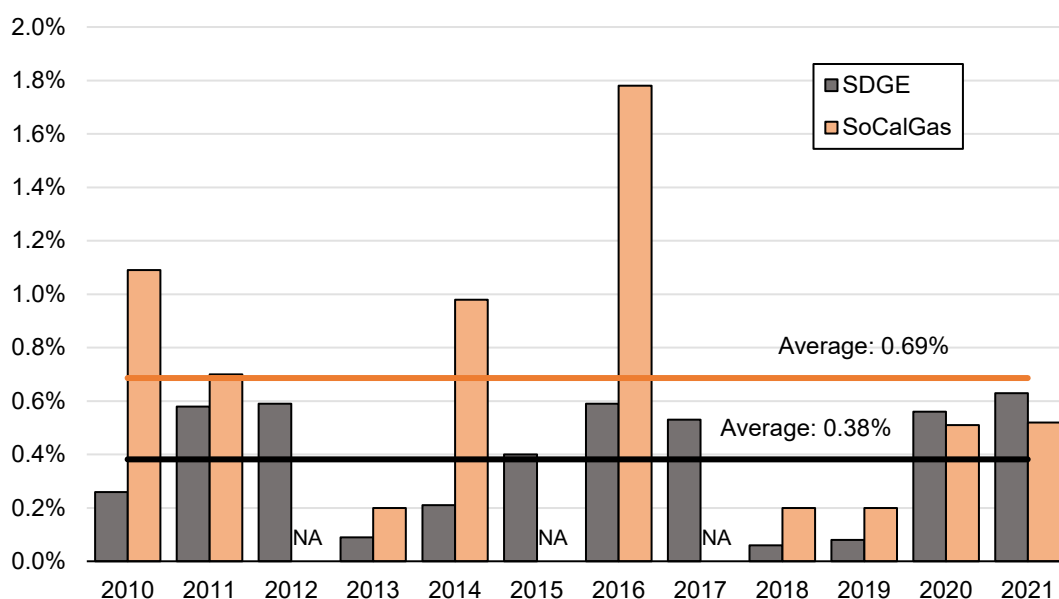
4   **1.**   **Cost of debt over-collection materially impacts customers costs – and**
5   **executive compensation.**

6 **Q. SDG&E witness Mekitarian dismissed your concern about cost of debt over-collection**

7   **as a "quibble."[191] How material is cost of debt over-collection to customer costs?**

8 A. SDG&E and SoCalGas's cost of debt forecasts have also overstated their actual costs of debt.

9   In 2021 excess, SDG&E's excess embedded interest resulted in at least $35 million of

10   unnecessary customer charges.[192]

11

12 **Q. How does cost of debt over-collection flow through to executive compensation?**

13 A. SDG&E executives personally benefit from cost of debt over-collection. For example, in

14   2021, the incremental earnings required for SDG&E's Short-Term Incentive Plan to *double*

15   the payout on the financial performance component was only $16 million, as seen in Figure

---

[190] SDG&E response to EDF data request EDF-DR-001 Question 3 (e-f); SoCalGas response EDF DR-01, Question 3.

[191] Exhibit SDG&E-07 (Mekitarian), p. 1.

[192] M. Ellis analysis of data provided in A.22-04-008 et seq., SDG&E response to EDF data request EDF-DR-001, Question 3 (a-b, e-f). Difference between authorized and actual COD (0.63%) multiplied by assumed debt of $5.5 billion (total ratebase minus equity reatebase). Based on the data provided, the debt could be as high as $6.4 billion (long-term debt), and the excess interest would be $40 million.

1   27 ($822 million vs. $806 million). Without cost of debt over-collection, the payout on the

2   SDG&E financial performance component would have been 88% of target, not the awarded

3   200%.[193] Cost of debt over-collection, by itself, increased the total company performance

4   component of executive short-term bonuses, which account for 85% of total short-term

5   bonuses, from 130% to 147% of target, a 13% increase.[194] This worked out to approximately

6     $55,000 in extra bonus compensation, on average, for SDG&E's top four officers, and

7     $75,000 for SDG&E's CEO.[195]

8   Inflated interest rate forecasts certainly aren't a "quibble" to SDG&E customers, or to

9   SDG&E executives.

10   **Figure 26. SDG&E 2021 Short-Term Incentive Plan financial performance metrics[196]**

Table 3b.1
2021 STIP – Minimum, Target and Maximum Versus Actual

Category	Sub-Category	Metric	Metric Type	Weight	Min	Target	Max	Actual Performance	Weighted Contribution
Financial		SRE Earnings	Lagging/Outcome	12%	2,226	2,368	2,510	**2,558**	24.00%
Financial		SDG&E Earnings	Lagging/Outcome	15%	766	806	822	822	30.00%
Subtotal: Financial				27%					54%
Subtotal: Company Performance				85%					147%
Individual		Individual Performance and Individual Safety Performance		15%					

12

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[193] M. Ellis analysis of data provided in SDG&E, *San Diego Gas & Electric Company's Documentation of Compliance with Executive Compensation Provisions of Public Utilities Code § 8389(e) and the Office of Energy Infrastructure Safety Guidance* (May 14, 2022), Table 3b.1. $35 million less assumed marginal tax rate of 28%. It was unclear how to interpret the description of the payout for earnings, "zero at minimum, 50% of target at performance at the minimum + 25% of the difference between minimum and target, 100% of target and straight-line interpolation between target and maximum." The 2023 STIP earning payout scale, "50% payout for earnings at the minimum/threshold level" with "straight line interpolation between minimum and target and target and maximum" was assumed instead.

[194] At $6.4 billion of debt, the financial performance payout would have been only 84% of target, and short-term bonuses would have been 127%, not 147%, of target.

[195] M. Ellis analysis of data provided in SDG&E, *San Diego Gas & Electric Company Independent Accountant's Report On Applying Agreed-Upon Procedures General Order No. 77-M Year Ended December 31, 2022* (May 26, 2023), *available at* https://www.SDG&E.com/sites/default/files/regulatory/2022%20PUBLIC%20SDG&E%20GO-77%20M_FINAL.pdf.

[196] *San Diego Gas & Electric Company's Documentation of Compliance with Executive Compensation Provisions of Public Utilities Code § 8389(e) and the Office of Energy Infrastructure Safety Guidance* (May 14, 2022), Table 3b.1.

      2.   Upwardly biased interest rate forecasts are a contributing factor in
               cost of debt over-collection.

3 **Q. Do you know why SDG&E and SoCalGas have been over-collecting their cost of debt?**

4 A. Cost of debt over-collection is at least partly attributable to the upwardly biased interest rate

5   forecasts they use to estimate the cost of future issuances of new debt. The source used by

6   SDG&E and SoCalGas, Global Insights, has a track record, like BCFF, of systematic upward

7   bias. Global Insight's 30-year Treasury forecast exceeded the actual yield by 0.76%, on

8   average, from 2014 through 2021.[197]

9

10 **Q. Do you agree with witness Mekitarian's testimony that the use of forecast interest rates**

11   **is "consistent with long standing Commission practice" and that "Global Insights has**

12   **long been recognized as an appropriate source for SDG&E proceedings."**

13 A. No. Witness Mekitarian cites the Commission out of context:[198]

14   Global Insights has long been recognized as an appropriate source for
15   SDG&E proceedings. In the 2019 Decision, the Commission found that
16   "Global Insight escalation rates are specific to the utility industry and more
17   accurately reflects SDG&E's . . . *inflationary* cost increases." In SDG&E's
18   2019 GRC, the Commission similarly concluded that "Global Insight's
19   forecasts have been utilized or served as the basis for utility forecasts in prior
20   and other GRCs. The resulting customer forecast also tracks well and has
21   minimal differences with historical data since 2012."

22   The Commission refers specifically to *inflation*, not interest rate, forecasts.

23   I have presented empirical evidence that both BCFF and Global Insight interest rate

24   forecasts have been systematically biased for many years, and that the current interest rate is

25   a far better predictor. It is possible that the Utilities and the Commission were not aware of

26   the bias in their preferred forecasts and the superiority of the current rate. But now that these

27   facts are known, what is the rationale for continuing to rely on forecasts known to

28   systematically transfer wealth from utility customers to utility shareholders – and, it turns

29   out, utility executives, as well?

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[197] M. Ellis analysis of data provided in SDG&E response to PCF data request PCF-SDG&E-02,
Question 2; FRED data, *available at* https://fred.stlouisfed.org/.
[198] Exhibit SDG&E-07 (Mekitarian), p. 14 (emphasis added).

1   **Q. As you noted in Section III.C.1 above, newly issued debt accounts for only 19% of the**

2   **total in SDG&E's embedded cost of debt calculation. Does the upward bias in the**

3   **forecast account for all of the cost of debt over-collection?**

4   A. It does not appear so, and witness Mekitarian made a similar observation.[199] But the elephant

5   in the room is the persistent, systematic cost of debt over-collection. If it's not due to inflated

6   interest rate forecasts, what is the cause? Witness Mekitarian never explains.

7

8   **B.   The Commission Should Investigate and Seek to Minimize Utilities'**

9   **Embedded Cost of Debt Over-Collection.**

10   **Q. What are your recommendations with regard to the embedded cost of debt? with**

11   **respect to the use of forecast interest rates in utility regulatory proceedings?**

12   A. I have two recommendations. The first is straightforward. As with the CAPM, and for the

13   same reasons described in Section VII.A above, the Utilities should be prohibited from using

14   a forecast interest rate in their embedded cost of debt calculation and required to use the

15   current rate.

16   In light of Utilities' persistent cost of debt over-collection, its material impact on

17   customer cost, and its unearned enrichment of utility executives, my second recommendation

18   is that the Utilities be required to provide a thorough investigation of the causes of cost of

19   debt over-collection and steps they will take to minimize it in the future.

20

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[199] Exhibit SDG&E-07 (Mekitarian), p. 13-14.

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   **IX.   CLOSING REMARKS**

2   **Q. Do you have any additional ideas about how the Commission's decision-making process**

3   **could be improved?**

4   A. Yes. Based on my observations and review of cost of capital proceedings before this

5   Commission and across the nation, I believe the Commission could benefit from considering

6   the following recommendations described by FERC ALJ Scott Hempling:[200]

7   (1) "frame the case as a public interest inquiry,"[201]

8   (2) "demand high quality testimony,"[202]

9   (3) "organize the evidentiary hearing around issues,"[203] and

10   (4) avoid regulatory capture.[204]

11 **Q. Would you describe the Commission's role in setting a rate of return as "more art than**

12   **science"?**

13 A. No. I disagree strongly with the claim that utility rate of return is "more art than science."

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[200] Scott Hempling, *Effective Regulatory Procedures: Purposes, Practices and Paths* (2016), available at https://www.accc.gov.au/system/files/Presentation%20by%20Scott%20Hempling%2C%20Attorney %20at%20Law%2C%20Maryland%20%2C%20USA%2C%20commentator%20on%20the%20Effect ive%20Regulation%20of%20Public%20Utilities.pdf.

[201] *Id.* at p. 11-12.

[202] *Id.* at p. 12-13 ("Effective testimony is educational testimony. … Pre-filed testimony should not merely state the party's position. An agency is not a supermarket where parties shop for private benefits. It is an expert tribunal charged with promoting the public interest. Successful testimony doesn't lobby for an outcome; it offers expertise and education. It offers perspectives, not positions.")

[203] *Id.* at p. 13-14 ("Effective hearings organize around issues rather than parties. The hearing days are divided into issue segments. For each issue segment, all parties' witnesses who address that issue appear on a panel simultaneously.")

[204] *Id.* at 15-16 ("'Capture' is an extreme form of persuasion. To achieve persuasion is to obtain what the persuader wants. To be persuaded is to give what the persuader wants. To be captured, then, is to be in a constant state of 'being persuaded' – based on the persuader's identity rather than an argument's merits. Regulatory capture is not persuasion in its illicit forms – financial bribery, threats to deny reappointment, promises of future employment. These things all have occurred, but they are forms of corruption, not capture. Nor is regulatory capture a state of being controlled, where regulators are robots executing commands issued by interest groups. Regulatory capture is neither corruption nor control. Regulatory capture is evidenced by a surplus of passivity and reactivity, along with deficit of curiosity and creativity. It is a body of commission decisions, or non-decisions, about resources, procedures, priorities and policies, where what the utility wants has more influence than what the public interest requires. Regulatory capture is defined by the regulator's attitude, not by the utility's actions. The active verb 'capture' signals an affirmative effort, to take someone captive. But the noun 'capture,' and the passive verb 'to be captured' – they signal a state of being. One can enter that state through one's own actions or inactions. One can allow oneself to be captured. One can assist, and sustain, one's own captivity.")

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis

1   Utility cost of capital experts often make the claim that setting a rate of return is "more

2   art than science" in an attempt to justify their biased and often illogical opinions. As my

3   testimony demonstrates, there are well-established best practices, supported by finance

4   theory and empirical evidence, on how to estimate the cost of capital. Every one of my

5   recommendations is backed by rigorous research. I make no hand-wavy, unsupported

6   assertions, I have nothing to hide, and I welcome scrutiny of my analysis and conclusions.

7   While different analysts may make slightly different assumptions, there is not much

8   wiggle room in estimating the cost of equity if done rigorously and thoughtfully. The

9   remarkable consensus across dozens of professional investment firms on the expected market

10   return demonstrates that there is a general "right way" to estimate the cost of equity. That

11   authorized utility ROEs consistently deviate so far from this consensus, and so systematically

12   in one direction, is proof that whatever is done in utility rate of return proceedings is a
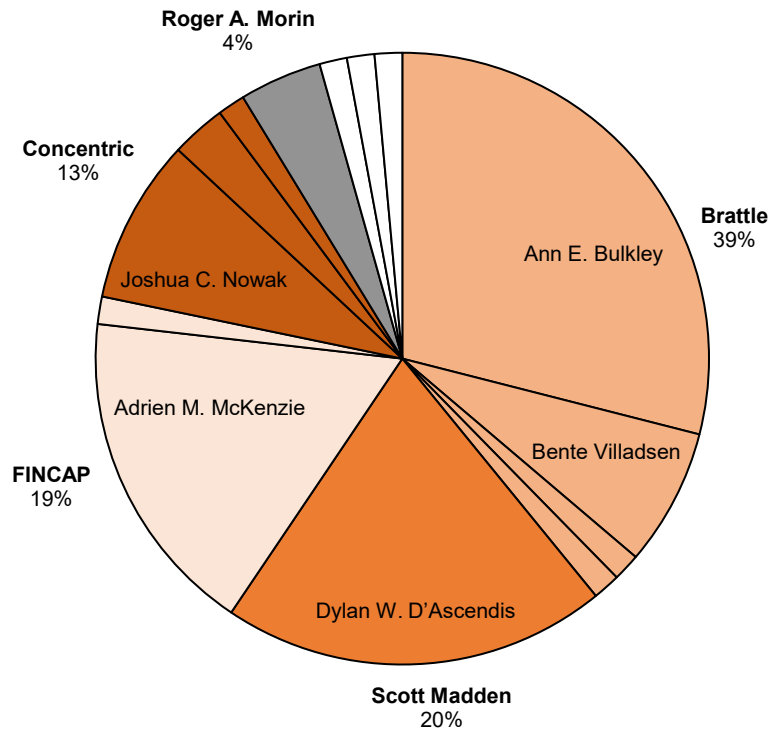
13   "wrong way."

14

15   **Q. Do you have any closing remarks based on your unique perspective as a former utility**

16   **executive responsible for the internal cost of capital function?**

17   A. Yes. In addition to creating, implementing, and overseeing Sempra's enterprise-wide cost of

18   capital function, I was responsible for hundreds of diverse and sophisticated economic and

19   financial analyses over the course of my 15 years with the company. I have a comprehensive

20   and detailed insider's understanding of how utility managers think about the cost of capital

21   and credit considerations in the context of investment decisions and shareholder value

22   creation.

23   I have testified on the cost of capital in regulatory proceedings for several of the largest

24   utility companies in the US. There is a great deal of consistency in utilities' cost of capital

25   analysis and testimony, likely attributable to the fact that just four firms provide over 90% of

26   testimony on behalf of utilities nationwide, as seen in Figure 28.

1   **Figure 27. Utility cost of capital expert market share[205]**
2   As of November 17, 2023

Roger A. Morin
4%

Concentric
13%

Joshua C. Nowak

Adrien M. McKenzie

FINCAP
19%

Brattle
39%

Ann E. Bulkley

Bente Villadsen

Dylan W. D'Ascendis

Scott Madden
20%

3

4   These four firms all have similar methodologies, which they have replicated – merely

5   changing the proxy group members and updating the assumptions for dividend yield, EPS

6   growth, risk-free rate, beta, etc. – in state after state, year after year, for decades, "as if

7   repetition equals erudition," in the words of ALJ Hempling.[206] But consistency should not be

8   confused with correctness. As the detailed analyses and explanations in my testimony

9   demonstrate, the testimony submitted by utilities and, unfortunately too often, my colleagues

10   testifying on behalf of intervenors, is rife with errors:

11   • Conceptually invalid models like the Risk Premium Model, Expected Earnings

12   Analysis, and Empirical CAPM;

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[205] M. Ellis analysis of S&P GMI, *available at* https://www.spglobal.com/marketintelligence/en/ [last accessed Nov 17, 2023], based on 69 pending rate cases. The Herfindahl-Hirschman Index, a measure of market concentration, is 2,493. Federal antitrust "agencies generally consider markets in which the HHI is … in excess of 1,800 points to be highly concentrated. See U.S. Department of Justice & FTC, Merger Guidelines § 2.1 (2023)." *Available at* https://www.justice.gov/atr/herfindahl-hirschman-index.

[206] Scott Hempling, *Effective Regulatory Procedures: Purposes, Practices and Paths* (2016), p. 6.

1   •   Unrealistic assumptions like extrapolating analyst's EPS growth forecasts into

2   perpetuity; and

3   •   Systematically biased input assumptions like forecast interest rates, adjusted beta, and

4   arithmetic average historical MRPs.

5   Much of the methodology, and certainly the results, of utility COC analysis would be

6 completely unrecognizable to finance researchers, practitioners, academics, and students.

7 Adopting my recommendations will help to simplify the process of determining the

8 appropriate rate of return for utilities by eliminating unnecessary analyses and complexity

9 that not only waste time and resources but also counterproductively sow confusion and result

10 in unnecessary and unearned wealth transfers from consumers to utilities (and utility

11 executives). Far too much bad finance persists in utility rate of return proceedings. This

12 Commission can put an end to it, and should.

MARK E. ELLIS

La Jolla, CA | mark.edward.ellis@gmail.com | 619-507-8892 | https://www.linkedin.com/in/mark-edward-ellis

SUMMARY

Mark E. Ellis is a former utility executive now working as an independent consultant and testifying expert in finance and economics in utility regulatory proceedings.

Before establishing his own consultancy, Mark led the strategy function at Sempra Energy (parent of SDG&E and SoCalGas) for fifteen years. Previously, he worked as a consultant in McKinsey's energy practice, in international project development for ExxonMobil, and in industrial demand-side management for Southern California Edison. He has an MS from MIT's Technology and Policy Program, where he focused on utility policy and conducted research in the MIT Energy Lab, and a BS in mechanical engineering from Harvard.

EXPERT TESTIMONY

Client	State	Utility	Description	Docket	Date
North Carolina Justice Center et al.	NC	Duke Energy Carolinas	Cost of capital	E-7, Sub 1276	1/23-ongoing
North Carolina Justice Center et al.	NC	Duke Energy Progress	Cost of capital	E-2, Sub 1300	1-8/23
The Utility Reform Network	CA	San Diego Gas & Electric, Southern California Gas	Wildfire liability insurance	A.22-05-015 & 016	1/23-ongoing
Georgia Interfaith Power & Light	GA	Georgia Power	Cost of capital	44280	8-12/22
Clean Wisconsin	WI	Wisconsin Electric Power, Wisconsin Gas	Cost of capital	5-UR-110	8-12/22
The Protect Our Communities Foundation	CA	San Diego Gas & Electric, Southern California Gas	Cost of capital	A.22-04-008, et seq.	4/22-ongoing
The Utility Reform Network	CA	Pacific Gas & Electric	Wildfire liability self-insurance	A.21-06-021	11/21-8/23
The Protect Our Communities Foundation	CA	Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison	Cost of capital	A.21-08-013, et seq.	11/21-ongoing
New Hampshire Department of Energy	NH	Aquarion Water Company of New Hampshire	Cost of capital	DW 20-184	6/21-2/22
The Utility Reform Network	CA	Pacific Gas & Electric	$7.5-billion wildfire cost securitization	A.20-04-023	6/20-2/21

EMPLOYMENT

Company	Title	Location	Date
Self-employed	Independent consultant and testifying expert	La Jolla, CA	2019-present
Sempra Energy	Chief of Corporate Strategy	San Diego, CA	2004-19
McKinsey & Company	Engagement Manager	Houston, TX	2000-03
ExxonMobil	Venture Development Advisor	Houston, TX	1996-2000
MIT Energy Laboratory	Research Assistant	Cambridge, MA	1994-96
Southern California Edison	Staff Engineer	Irwindale, CA	1994
Sanyo Electric Company	Research Engineer	Osaka, Japan	1992-93
Los Angeles Department of Water & Power	Seasonal Waterworks Laborer	Chatsworth, CA	1988

MARK E. ELLIS

Independent consultant and testifying expert in utility finance and economics

START-UP

Organization	Title	Description	Date
Gridware	Advisor	Y Combinator graduate developing wildfire prevention technology for electric utilities	2021-present
GATEMatrices	CEO & Founder	Created iOS app to prepare elementary-school children for gifted-and-talented education program admission tests	2013-22
Apertur	CEO & Founder	Created a technology-enabled professional development platform of workshops, assessments, toolkit, and apps to help organizations improve their culture and decision-making by reducing cognitive bias	2013-21
Climate Policy Initiative	Power Program Director	Climate change policy advisory non-profit funded by George Soros	2010-13

NON-PROFIT BOARD

Organization	Date	Organization	Date
Harvard Club of San Diego	2015-17	Chabad Hebrew Academy	2007-14
Congregation Adat Yeshurun	2005-12	San Diego Agency for Jewish Education	2005-07

EDUCATION

Institution	Degree	Date
Massachusetts Institute of Technology	MS, Technology and Policy	1996
Harvard University	BS, *magna cum laude,* Mechanical and Materials Sciences and Engineering	1992

Exhibit PCF-09: Phase 2 Opening Testimony of Mark E. Ellis