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Improving Utility Performance Incentives in the United States

A Policy, Legal and Financial Framework for Utility Business Model Reform

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Foreword

What motivates utilities and their managers? Duty? Service? Stock price? Risk management? Which of these dominates? And how does government regulation make a difference?

Performance-based regulation, in all its forms, has attracted attention for a long time. RAP has been writing about this since our founding three decades ago. Each decade brings new opportunities to close the gap between public and private interests. Equity and climate change mitigation have emerged as priorities in many places. But in these new areas of emphasis, the questions are ultimately the same — how can we motivate for progress and innovation, not just in outcomes, but also in how our public service companies make decisions and do their work?

Several state regulatory commissions have been innovating with performance incentives recently, and others are considering new performance systems. Understanding the proper role of performance incentives, as both rewards and penalties, in the context of utility rate-making and compensation is the challenge the authors of this report address. On their behalf, I hope this effort adds to the conversation.

Here, we take a hard look at existing regulatory practices and explore the incentives currently used in rate-making. This report shows that, with respect to return on equity (ROE), typical regulatory practices have not caught up with a modern understanding of finance. Alfred Kahn clearly explained in 1970 why the "cost of equity" *as viewed by investors* and the "return on equity" *as set by regulators* in a rate case are fundamentally two different concepts.[1] Commissions may conflate these in a way that obscures pivotal incentives implicit in setting the ROE. Fifty years on, we want to shine a light on this key distinction. Similarly, utilities sometimes assert that a lower ROE increases risk. But again, a close look shows that while a lower ROE may modestly increase risk to bondholders, the predominant impact is a lower *expected value* for *existing* shareholders, which has little to do with *risk*. More simply, a lower ROE makes rates more affordable for customers but, all else being equal, decreases an investor-owned utility's stock price, thus lowering the wealth of *existing* shareholders. Prospective investors are not necessarily benefited by a higher ROE because that will likely be reflected in a higher purchase price for newly issued shares. Understanding these concepts should make the choices inherent in innovation clearer, expand the range of options available for performance incentives and ultimately help regulators craft solutions that support the public interest.

Regulatory innovation takes hard work and skill from utility commissioners, staff and other stakeholders. The status quo has an understandable attraction. With recent, significant inflation and rising interest rates, commissions may feel pressure to increase utility rates generally and the rate of return specifically. This pressure can be an opportunity to take stock of past practices and apply new thinking to guide utilities in the future.

–Richard Sedano, RAP President and CEO

[1] Kahn, A. (1970). *Economics of Regulation: Principles and Institutions,* (vol. 1), pp. 42–54. Wiley.

Executive Summary

The flaws of traditional methods of utility regulation generally and rate-making specifically, including capital bias, the throughput incentive and inattention to innovation, have been discussed for decades. A wide variety of reforms has been contemplated and implemented in an attempt to remedy these deficiencies. Since the 1970s, regulators have developed *explicit* performance-based financial incentives — often called *performance incentive mechanisms* or PIMs — to address specific priority areas. They are based on quantifiable and measurable indicators (e.g., reducing power outages or increasing energy efficiency penetration), which translate into financial rewards or penalties for the utility. These mechanisms are the focus of this report.

Experience with these explicit outcome-based financial incentives to date has been mixed or inconclusive, for several related reasons. Many PIMs have been modest in monetary magnitude and, at best, have only been shown to have modest results. Small deviations from status quo regulatory policies are, almost by definition, unlikely to be transformative. Furthermore, the correct baseline against which to measure utility performance is difficult to establish in many cases, and so demonstrating any meaningful outcome at all can be elusive. The question this report attempts to answer is how can we make performance incentives a more effective tool to accelerate the modernization of the electric system and achieve other regulatory goals? Solving this riddle and broader questions about utility business model reform requires a detailed understanding of existing regulatory frameworks, financial markets, relevant legal constraints and competing policy priorities.

The management of investor-owned utilities, while attempting to reconcile various interests, are ultimately working for shareholders. Thus, getting a proper understanding of improved performance incentives requires that regulators shift their ultimate focus away from accounting measures, such as profits or achieved return on equity (ROE), and toward stock price and all the underlying factors that drive it, when designing incentive mechanisms. Changes in book measures, such as increased accounting profits[2] (whether measured as net income, return on common equity or earnings per share), do not always lead to the expected changes in investor value. To highlight this issue in more detail, we apply a common stock-valuation approach (i.e., the residual income model[3]) in setting forth an internally consistent and rational financial framework for effective incentive mechanism design. In this framework, the concept of accounting profits must be superseded by the concept of *economic profits*, which incorporates the cost of equity as defined by the investor's opportunity cost in broader financial markets. As we show, while those accounting figures are important, they are not the sole drivers of the measure of ultimate interest to investors — namely, the utility's stock price. Both financial models and the utility's actual stock market performance demonstrate that increasing utility accounting profits can destroy investor value under certain conditions, such as those that

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[2] Accounting profits are defined as revenue minus a set of explicitly quantified costs, such as operating expenses, debt payments, taxes and capital asset depreciation. These costs typically exclude the cost of equity capital.

[3] Feltham, G. A., & Ohlson, J. A. (1995). Valuation and clean surplus accounting for operating and financial activities. *Contemporary Accounting Research, 11*(2), 689–731. Wiley. https://doi.org/10.1111/j.1911-3846.1995.tb00462.x . Under clean surplus accounting, this model is simply a reexpression of the dividend discount model (DDM) or discounted cash flow (DCF) model.

characterized the U.S. electric utility industry in the late 1970s and early 1980s. Significant evidence shows, however, that regulatory practice for the past three decades has typically set ROE significantly higher than a reasonably estimated cost of equity. This has important practical consequences for the effectiveness of performance incentives because it makes continued capital investment growth quite valuable to shareholders.

The most important legal constraint on utility business model reform is the Takings Clause of the Fifth Amendment to the U.S. Constitution, which is applied to states through the 14th Amendment. The Takings Clause provides a general lower bound on the level of utility revenues approved by utility regulators, although there are important exceptions. U.S. Supreme Court decisions since the 1940s have emphasized that there is flexibility in the methods that utility regulators can use, but it is clear that approved utility revenue levels must cover reasonable estimates of operating expenses, taxes and a payment for the capital invested in the enterprise. Specifically, regarding payment for capital, the most frequently cited standard is that the U.S. Constitution "guarantees an opportunity for a fair rate of return."[4] Four common threads are important to this specific discussion:

1. The end result of the rates set and the overall impact on utility investors is what matters, and there is substantial flexibility in the methods that can be utilized in rate-making.
2. The standard for returns comparable to other companies with similar risks reflects a look across the economy and does not direct a more strict or limited comparison with companies of the exact same type.
3. The standard for capital attraction is consistent with the notion that there is a range of permissible returns and that a constitutional minimum might be a return that compensates investors for the risks they are taking.
4. Shareholders do not receive absolute protection from the consequences of poor management or adverse changes in markets.

In contrast, other relevant legal standards, such as the requirement for "just and reasonable" rates, provide very little judicial discretion to overturn revenue levels in the aggregate as being too generous to a utility[5] and do not provide a utility any more protection on the downside than the Takings Clause.

[4] Southwest Bell Tel. Co. v. Public Service Commission of Missouri, 262 U.S. 276, 290 (1923) (Brandeis, J., concurring in judgment). To the authors' knowledge, this key phrase has not appeared in any majority opinion from the U.S. Supreme Court.

[5] Individual cost elements of the revenue requirement can be challenged judicially and sometimes are overturned for failure to meet relevant evidentiary or substantive requirements. But to the authors' knowledge, courts have not agreed with an overall challenge to utility rates for being too high as a more general matter.

We believe that these policy, financial and legal considerations ultimately provide a framework for regulators and other policymakers to think about utility business model reform, including performance incentives. This set of factors points to a four-step process to integrate performance incentives, both rewards and penalties, into rate-making for investor-owned utilities.[6]

1. This starts with a properly estimated cost of equity. This includes reasonable estimates of the cost of equity using the discounted cash flow model, the capital asset pricing model or equity risk premium analysis but not the comparative earnings method because it does not utilize market information to estimate the cost of equity.
2. Second, a cost-of-service estimate must be included to set base revenue levels for the utility. Under the relevant legal principles, reasonable allowances to cover utility costs to serve must be built into rates, with both traditional and more innovative methods for estimating those costs.
3. Third, an incentive-setting process should have a robust stakeholder discussion about the key policy goals, relevant outcomes and data-driven metrics that feed into the performance incentive framework.
4. Last and certainly not least, the actual formulas for performance incentives, either rewards or penalties, must be determined.

We propose four key principles to consider when integrating PIMs into rate-making through this process: (1) materiality, (2) constitutionality, (3) clarity and (4) benefits commensurate with overall costs. Ultimately, these four principles contain many judgments for policymakers to make, including appetite for potential legal risk.

Within this framework, a reasonable cost of equity is a financial parameter to estimate, but not necessarily a final input into rate-making. This can be viewed as the floor authorized return for a well-managed regulated utility in a stable industry, one that compensates investors only for the utility's exposure to economy-wide macroeconomic risk factors, ignoring potential impacts associated with firm-specific risks, as suggested by finance principles, applied finance academics and independent investors.[7] We propose that the internally consistent, valuation-based cost of equity estimation should form the foundation upon which regulators should build effective incentive mechanisms. The final baseline authorized ROE and any financial rewards or penalties are policy choices that must be made by regulators within their legal constraints. Alfred Kahn articulated over 50 years ago what a good solution must look like. If utilities perform well, with performance defined and measured by the regulator, they should expect to earn returns in excess of the cost of equity; if they perform poorly, they should expect to earn only the cost of equity, not more and perhaps less. The fact that the returns on equity typically authorized by commissions in recent years have been higher than a reasonably estimated cost of equity provides an important source of flexibility for future reforms. To illustrate this framework and its principles, we compare two specific combinations of policies to traditional

[6] There are aspects of this process that must feed back into each other, so the authors do not suggest that these steps are fully independent and linear.

[7] Koller, T., Goedhart, M., & Wessels, D. (2020). *Valuation: Measuring and Managing the Value of Companies*. Wiley.

regulation (see Figure 1): (1) a rewards-only approach, where baseline cost of service includes only the minimum cost of equity but performance incentives provide substantial potential upside and (2) a penalties-only approach where baseline cost of service includes a higher ROE but penalties could potentially lower revenue to the minimum cost of equity in the event of poor utility performance.

Figure 1. Comparison of reward and penalty policies to traditional regulation

In principle, these two frameworks could produce similar results, and differences would come from subtler factors, such as the timing of revenue collection and long-term expectations for the rate-making framework. Both of these approaches could reasonably be considered an improvement on status quo rate-making frameworks. While these approaches could produce lower economic profits (compared with current rate-making practices) for poorly performing utilities, they could also produce similar or higher economic profits for those that perform well. If a utility earned lower economic profits than current rate-making models would produce, that would be, at least in part, a result of its own doing — failing to meet defined performance objectives. This goes to Alfred Kahn's fundamental point about higher ROE — they represent good policy only if the utility does something to *earn* them.[8]

[8] Kahn, 1970.

I. Introduction

The literature on the regulation of investor-owned utilities (IOUs) has discussed the incentives and disincentives affecting these entities for many decades.[9] Most of this discussion addresses cost-of-service regulation, particularly the now typical historic original cost calculation of the rate base. This includes a bias in certain circumstances toward utility-owned capital assets, known as the Averch-Johnson effect,[10] as well as the more general inefficiencies of "cost-plus" revenue structures. More recently, regulators have also been concerned with traditional regulation's "throughput" incentive, the simple fact that a utility's net income almost always increases as its electricity sales increase, which inhibits efforts to promote least-cost planning generally and customer-side resources more specifically.[11] By the mid-1990s, much of this discussion began to take place under the general framework of performance-based rate-making (PBR)[12] and included issues relating to efficient patterns for investment in utilities and incentives for broader societal concerns like environmental protection.[13] By 2017, the discussion of PBR included identification of "next generation" approaches that built upon decades of experience across the globe and described how they could be applied in a modern context to aid in the transformation of the electric system.[14] Some authors have focused on electric utilities when writing about PBR, but the same set of issues frequently comes up in other regulatory contexts, notably gas utilities.[15]

A significant part of the PBR discussion has focused on direct outcome-based financial performance incentives for utilities, including both penalties and rewards, that are frequently referred to as performance incentive mechanisms or PIMs.[16] These financial incentives have been designed to address many different issues over the decades, and

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[9] See, e.g., Trebing, H. (Ed.). (1968). *Performance Under Regulation*. Michigan State University, Institute of Public Utilities.

[10] Averch, H., & Johnson, L. (1962). The Behavior of the Firm Under Regulatory Constraint. *The American Economic Review, 52*(5), 1052–1069. https://doi.org/10.7249/P2488-1

[11] See, e.g., Moskovitz, D. (1989, November). *Profits and Progress Through Least-Cost Planning*. National Association of Regulatory Utility Commissioners, Washington D.C. https://www.raponline.org/knowledge-center/profits-progress-through-least-cost-planning/

[12] The terms "performance-based rate-making" and "performance-based regulation" are sometimes used interchangeably and both have the same acronym of PBR. However, some authors may use "performance-based regulation" in a broader sense than "performance-based ratemaking."

[13] See, e.g., Woolf, T., & J. Michals. (1995). Performance-based ratemaking: Opportunities and risks in a competitive electricity industry. *The Electricity Journal* 8(8), 64–73. https://www.sciencedirect.com/science/article/pii/1040619095900187 and

Biewald, B., Woolf, T., Chernick, P., Geller, S., & Oppenheim, J. (1997, Nov. 8). *Performance-Based Regulation in a Restructured Electric Industry*. National Association of Regulatory Utility Commissioners. https://www.synapse-energy.com/sites/default/files/SynapseReport.1997-11.NARUC_.PBR-in-a-Restructured-Electricity-Industry..97-U02.pdf

[14] See e.g., Littell, D., Kadoch, C., Baker, P., Bharvirkar, R., Dupuy, M., Hausauer, B., Linvill, C., Migden-Ostrander, J., Rosenow, J., Wang, X., Zinaman, O., & Logan, J. (2017, Sept. 12). *Next-Generation Performance-Based Regulation: Emphasizing Utility Performance to Unleash Power Sector Innovation*. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/next-generation-performance-based-regulation-emphasizing-utility-performance-unleash-power-sector-innovation/

[15] See Anderson, M., Lebel, M., & Dupuy, M. (2021, May 6). *Under Pressure: Gas Utility Regulation for a Time of Transition,* pp. 51–53. Regulatory Assistance Project. https://www.raponline.org/wp-content/uploads/2021/05/rap-anderson-lebel-dupuy-under-pressure-gas-utility-regulation-time-transition-2021-may.pdf and

Comnes, G. A. (1994, November). *Review of Performance-Based Ratemaking Plans for U.S. Gas Distribution Companies*. Lawrence Berkeley National Laboratory. https://eta.lbl.gov/publications/review-performance-based-ratemaking

[16] The term "PIMs" is sometimes also used to describe shared savings mechanisms and other types of incentive mechanisms. This policy brief is focused more narrowly on outcome-based performance incentives, which concentrate on directly measurable external values and not on shared savings mechanisms, which typically focus on the cost of implementing certain projects.

several states have recently started to apply them in a broader range of ways than in the past. PIMs, as a part of the more general category of policies implemented under the heading of PBR, can help transform the centralized, one-way, fossil-fuel-dominant electric system of the past to a modern, clean, equitable and dynamic future grid. But most PIMs to date have been relatively small, whether penalties or rewards, and the results that have seemed to flow from them have been commensurately modest in most cases. In this policy brief, we explore how PIMs can be made more impactful and effective as part of the modernization of utility regulation.

PIMs cannot, however, be considered in isolation from other factors that influence utility behavior.[17] This can be a complex undertaking, and this complexity grows further when PIMs are combined with other potential reforms. RAP publications have shown how these types of comparisons can be done generally.[18] And publications by the coauthors of this policy brief have looked at key aspects of these questions as well.[19]

This report dives deeper than those earlier publications in three ways:

1. Through specific consideration of the theoretical issues and trade-offs in the design of PIMs.
2. By consideration of the most relevant and common legal limitations for rate-making and utility business model reform in the United States.
3. Through application of modern corporate finance principles with respect to IOUs and consideration of the role of the return on equity (ROE) in rate-making.

While the discussion focuses on PIMs, this effort requires a more broadly applicable set of tools, to which we refer throughout. The application of these tools to the specific question of PIMs reveals nuances that may not be obvious. For example, it is not necessarily the ROE or rate of return itself that creates capital bias, but rather a rate of return higher than the true cost of capital. This distinction has not been stated precisely in some of the most sophisticated regulatory efforts to date around PBR.[20]

Full appreciation of these subtleties will, we hope, advance the effort to design more effective PIMs in practice, building upon existing state examples and other sophisticated

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17 As RAP founder David Moskovitz explained in 1989, "[a] regulatory reform plan and its implementation should be compared to the existing system" (Moskovitz, 1989, p. 7). RAP has frequently noted that "all regulation is incentive regulation," a saying that can be dated back as far as 1989 to Peter Bradford, then chair of the New York Public Service Commission (Bradford, P. (1989). *Incentive Regulation from a State Commission Perspective* [Remarks to the Chief Executive's Forum].)

18 See, e.g., Regulatory Assistance Project. (2000, December). *Performance-Based Regulation for Distribution Utilities*. https://www.raponline.org/knowledge-center/performance-based-regulation-for-distribution-utilities/

19 Kihm, S., Cappers, P., Satchwell, A., & Graffy, E. (2018, May). Corporate Finance and Sustainability: The Case of the Electric Utility Industry. *Journal of Applied Corporate Finance, 30*(1), 106–111. https://onlinelibrary.wiley.com/doi/abs/10.1111/jacf.12283 and Kihm, S., Lehr, R., Aggarwal, S., & Burgess, E. (2015, June). *You Get What You Pay For: Moving Towards Value in Utility Compensation, Part I — Revenue and Profit*. Energy Innovation. https://energyinnovation.org/publication/you-get-what-you-pay-for-moving-toward-value-in-utility-compensation-part-1-revenue-profit/

20 See, e.g., Hawaii Public Utilities Commission (2019, Feb. 7). Staff proposal for Updated Performance-Based Regulation No. 2018-0088, Proceeding to Investigate Performance-Based Regulations, p.39. https://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A19B07B43028G00218

("Traditional utility regulation creates an inherent bias for utilities to prefer utility-owned capital investments over other solutions because utilities earn a rate of return on capital expenditures (capex) but not operational expenditures (opex).")

work in this area.[21] Rewards and penalties that are greater in magnitude may be one part of the answer, but are not the only solution. Packages of rate-making reforms, such as a lower base ROE and larger positive potential rewards for the utility, are one attractive solution. But one could also consider constructing the package in a different way — with a higher base ROE and larger potential financial penalties. Some important distinctions can reasonably be made between the relevant alternatives, but ultimately many judgment calls will be left to the regulators, utilities and stakeholders in each jurisdiction. Of course, the answers to many concerns may not be found in performance incentives based on quantitative metrics at all, but in another policy approach either inside or outside the jurisdiction of a public utility commission.

II. The State of Investor-Owned-Utility Business Model Reform and Performance Incentives

A. The Natural Monopoly and Issues with Cost-of-Service Rate-Making

The economic characteristics of network services are such that they can be most efficiently provided by a single entity.[22] In this sense, they are "natural" monopolies and therefore require government regulation to prevent abuses of market power. Traditionally regulated IOUs are thus generally subject to price, network access, service quality and entry regulations.[23] For electric or gas service, this typically means that a utility has a monopoly service territory where no other providers can operate but where they must provide safe, reliable and nondiscriminatory service at just and reasonable rates. Under typical cost-of-service rate-making for IOUs, an explicit profit provision is included in rates, which grants the regulated entity the opportunity to earn a return on any prudently invested capital.[24] For IOUs, this profit provision is often described as a primary motivator for both corporate planning and operational decisions they undertake.

In the traditional rate-making model, there is an established formula for determining the size of this provision for profits, although the details are often heavily litigated. The utility's "rate base" is defined as the historic original cost of prudently made capital

[21] Whited, M., Woolf, T., & Napoleon, A. (2015, March 9). *Utility Performance Incentive Mechanisms: A Handbook for Regulators.* Synapse. https://www.synapse-energy.com/synapse-handbook-provides-guidance-designing-implementing-utility-performance-incentive-mechanisms and Aas, D., & O'Boyle, M. (2016, June 24). *You Get What You Pay For: Moving Toward Value in Utility Compensation.* Energy Innovation. https://energyinnovation.org/article/get-pay-moving-toward-value-utility-compensation/

[22] The characterization of the electric industry in this respect has evolved over time. One of the ideas that led to wholesale electric restructuring was that economies of scale no longer dominated other factors for the generation portion of the electric system and thus competition, markets and new entrants would lead to more efficient results. As technology continues to evolve, competition can potentially be brought to other parts of the electric industry, such as through competitive procurement of nonwires solutions as an alternative to some traditional utility investments. This evolution may not fully replace traditional rate-making for all portions of the electric system.

[23] Joskow, P. (2006, March). *Incentive Regulation in Theory and Practice: Electricity Distribution and Transmission Networks.* Cambridge Working Papers in Economics. https://www.researchgate.net/publication/4924589_Incentive_Regulation_in_Theory_and_Practice_Electricity_Distribution_and_Transmission_Networks

[24] Lazar, J. (2016, July 12). *Electricity Regulation in the US: A Guide* (2nd ed.), pp. 47–60. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/electricity-regulation-in-the-us-a-guide-2/

investments, subtracted by the accumulated accounting depreciation of those capital investments since they were placed into service. The rate base is multiplied by an overall rate of return, which is calculated by using the weighted average of the return on debt and return on common equity[25] within the utility's capital structure.[26] The return on common equity is not typically linked to actual issuances by the regulated entity, but rather to the market conditions at the time of the rate case. The return on debt is more frequently tied to actual bond issuances but in any case is typically less controversial because it is simpler to observe both for particular bond sales and in the market more generally.

Frequently Cited Methods for Estimating ROE

One of the key regulatory determinations in rate-making is setting a utility's ROE. For most utilities in the United States, this is mostly or entirely common stock. Unlike bondholders, owners of common stock do not receive any guaranteed income, but rather expect to receive (1) dividends as determined by a company's board and (2) market increases in the stock price. The oldest method used is known as the *comparable earnings method,* where the ratio of reported net earnings per share and the current book value per share are calculated for a group of proxy companies.[27] The ratio for these proxy companies can then be analyzed in several different ways to help determine a ROE for the company in question.

The simplicity of the comparable earnings method made it feasible in the early 20th century, but financial insights gained in the mid-20th century have enabled superior techniques to properly estimate the cost of equity. These modern techniques all recognize that the cost of equity is an opportunity cost for investors. This cannot be observed directly using accounting values but must be estimated using relevant data from the marketplace. Modern methods can be divided into two categories: (1) implied methods, such as the discounted cash flow (DCF) model, and (2) portfolio theory methods, like the capital asset pricing model (CAPM). The *discounted cash flow model* and its variants, such as the *residual income model*, take the share price as the discounted value of the long-run income streams to the shareholder. Key variables to estimate the cost of equity in this model are the dividend per share, the current stock price and the long-run dividend growth rate.

The *capital asset pricing model* links the cost of equity for a specific company to the cost of equity in the market, where the key variable is known as the beta coefficient, which measures the correlation between the risks of this one company and the market as a whole. This reflects an understanding that risks that can be diversified away in the market should not be reflected in the company's cost of equity. The beta coefficient is then used to calculate how much higher than the risk-free rate, typically based on U.S. Treasury bonds, the company's cost of equity is. The *risk premium method* can be viewed as a simplified version of CAPM, where the utility cost of equity is determined by using the market to estimate how much higher it should be than the utility cost of debt. The reference point in these methods is not authorized or earned utility returns on equity but the returns investors require on utility stocks in the market.

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[25] This weighted average return is also frequently referred to as the "weighted average cost of capital" or WACC. In many circumstances this is a misnomer because the return on equity used is not a reasonable cost of equity, which is discussed at length in Section V.

[26] Other forms of capital, if used, are also incorporated in the overall rate of return. Some of these other options (e.g., preferred stock) may be used less frequently now than in decades past and are typically a very small portion of overall capital.

[27] In a publication for the National Association of Regulatory Utility Commissioners, John Quackenbush has stated that the comparable earnings method "does not technically measure the cost of equity because no market information is utilized." Quackenbush, J. (2019,

The larger the utility's rate base and the higher the approved rate of return, the larger is the overall revenue requirement and thus the larger is the opportunity to earn accounting profits. After a rate case is over and new rates are in effect, the level of accounting profits actually achieved by the regulated entity is influenced by several factors, such as (1) the level of the rates themselves, including the provision for a rate of return, (2) any cost reductions (or increases) from the levels determined in the rate case and (3) changes in sales to customers and other billing determinants.

This business model for IOUs likely motivates several corporate behaviors that may not be well aligned with either economic efficiency or the public interest in the achievement of broader policy initiatives. However, there are frequent arguments on each side of every issue. First and most generally, the "cost-plus" structure of the revenue requirement may not provide a strong incentive for the efficient management of costs, particularly given the difficulty in some cases of monitoring and disallowing imprudent or unreasonable costs by regulators. Any costs that are not disallowed by regulators are passed on to ratepayers, and if demand is sufficiently inelastic, there are few negative consequences for utility management. The other side of this argument is that cutting costs between rate cases can increase utility profits, which should provide some incentive for efficient management of costs. As a result, this means that there is no perfectly generalized set of incentives facing utility executives and the emphasis on cost control may vary according to numerous specific circumstances.

Second, under traditional rate-making structures, utilities have a strong incentive to sell more electricity, as long as the marginal revenue collected exceeds the short-run marginal cost to deliver one more unit of electricity, which is almost always the case. As sales increase (or decrease), utility net earnings increase (or decrease) by an order of magnitude, providing a strong incentive to increase sales and avoid anything that might decrease sales. This "throughput incentive" can undermine utilities' interests in the broader pursuit of energy efficiency or other customer investments in technologies that reduce electricity sales.[28] Some believe this also undermines their interests in innovating beyond the traditional electric commodity more generally.[29] Many jurisdictions have addressed the throughput incentive by implementing revenue regulation, which is more colloquially known as "decoupling."[30] In principle, this means that a utility is neutral to the short-term levels of customer billing determinants (e.g., kilowatt-hour sales) because any unexpected revenue increases due to higher sales would get refunded to customers and any undercollections due to lower sales would likewise be recouped in the future.

Finally, when given the choice between investing capital or pursuing noncapital options to address a problem or grid need, the utility has a bias under certain circumstances toward

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December). *Cost of Capital and Capital Markets: A Primer for Utility Regulators,* pp. 19. United States Agency for International Development. https://pubs.naruc.org/pub.cfm?id=CAD801A0-155D-0A36-316A-B9E8C935EE4D

28 Moskovitz, 1989. In addition, certain types of adjustment mechanisms, such as fully reconciled fuel and purchased power mechanisms, can virtually guarantee that any incremental sale is accretive to earnings and any lost sale results in earnings attrition.

29 Kihm, S., Beecher, J., & Lehr, R. (2017, May). Regulatory Incentives and Disincentives for Utility Investments in Grid Modernization. *Future Electric Utility Regulation,* (8). https://emp.lbl.gov/publications/regulatory-incentives-and

30 Lazar, J., Weston, F., Shirley, W., Migden-Ostrander, J., Lamont, D., & Watson, E. (2016, Nov. 8). *Revenue Regulation and Decoupling: A Guide to Theory and Application*. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/revenue-regulation-and-decoupling-a-guide-to-theory-and-application-incl-case-studies/

expanding its rate base through capital investment.[31] The fundamental issues around this capital bias are more complex than sometimes portrayed, and, as the Averch-Johnson article itself makes clear, capital bias would only be expected if the rate of return is higher than the cost of capital.[32] The actual relationship between the ROE and the underlying cost of equity, and thus the relationship between the rate of return and cost of capital, are discussed at length in Section V below. Perhaps proving the point that there are two sides to every argument, Alfred Kahn stated that any capital bias could potentially be a productive counterweight to the tendency of a monopoly utility's incentive to raise prices and restrict quantities.[33]

B. Reforms Proposed and Pursued

Over the past 50 years, a number of reforms have been proposed and implemented to address these misalignments. In the most far-reaching case, regulated electric utilities have had the scope of their monopoly franchises changed through the restructuring of certain markets.[34] For example, in the late 1970s, the U.S. Congress passed the Public Utility Regulatory Policies Act of 1978 (PURPA) that created a limited form of wholesale competition for the generation of electricity. Then in the early 1990s, the Energy Policy Act of 1992 opened the door for state policymakers to introduce full wholesale-generation-market restructuring as well as the competitive provision of retail generation services to end-user customers. Another version of competition in some jurisdictions is a limited term for utility franchises, which are put out to competitive bid on a periodic basis. However, in many cases, more modest alterations to cost-of-service regulation have been pursued that attempt to better align the utility's performance with regulators' expectations.

As mentioned previously, one such reform that has been pursued by multiple states is decoupling, or "revenue regulation," to ameliorate the short-term throughput incentive. Ideally, decoupling also encourages the utility to focus on productive methods for increasing net earnings, such as increasing operational efficiency, instead of focusing on increasing sales. Other kinds of reforms involve a more transparent planning process, sometimes with explicit approval mechanisms for major capital investments. In the 1980s, this became known as integrated resource planning, in part because it integrated both supply-side and demand-side options. More recently, integrated distribution planning in some jurisdictions is a much more granular process for considering distribution capital investments, and this trend has been motivated by new distribution system monitoring and management technologies. These new distribution system technologies can be quite expensive but hold out the promise of major benefits as well.

Multiyear rate plans, which often come with an explicit "stay out" provision or moratorium where the utility is not allowed to file a rate case, are another rate-making reform tool. In

[31] Averch & Johnson, 1962.

[32] Averch & Johnson, 1962, pp. 1053. ("[I]f the rate of return allowed by the regulatory agency is greater than the cost of capital but is less than the rate of return that would be enjoyed by the firm were it free to maximize profit without regulatory constraint, then the firm will substitute capital for the other factor of production and operate at an output where cost is not minimized.").

[33] Kahn, A. (1971). *The Economics of Regulation: Principles and Institutions* (vol. 2), pp. 49. Wiley.

[34] Many other previously regulated industries underwent even more substantial restructuring and changes to statutes and regulations that would be more properly termed as "deregulation." In the case of electric utilities, we believe this is more properly characterized as a restructuring of the industry in many locations and the creation of new and different forms of regulation.

theory, this provides the utility with increased incentives for cost cutting between rate cases, because the utility can increase net earnings during this time period.[35] There are different deviations from traditional historic cost-of-service methods for setting a test-year revenue requirement, including future test years and "totex" mechanisms designed to equalize treatment of capital investments and operational expenditures.[36] Under multiyear rate plans, a number of different alternatives are then used to adjust allowed revenues and rates from year to year, including "attrition relief mechanisms" or "exogenous cost factors" that account for different kinds of expected and unexpected changes to costs over time. Yet another tool is an earnings sharing mechanism, which shares surplus or deficit net earnings with customers when a utility's actual net revenue deviates from the range approved in a rate case. It is important to note that the targets for earnings sharing and the targets for decoupling are typically two different formulas, so the resulting interplay between earnings sharing and decoupling can be complex.

Performance incentives and penalties have long been a part of the regulator's toolkit.

To address more specific performance deficiencies or to promote new policy initiatives, regulators have also introduced financial performance incentives intended to directly compensate the utility for the achievement of specific objectives or, conversely, to penalize a utility for failing to achieve those objectives. It is these performance incentive mechanisms that this report primarily concerns itself with. These frequently come with routine data tracking and reporting, often called "metrics," outside of the historically typical disclosures during a rate case. Tracking and reporting metrics without any associated financial incentives are typically thought of as a transparency measure, which can have a variety of beneficial impacts. PIMs and metrics are often bundled into a broader rate-making framework called "performance-based regulation" or PBR.[37] PBR often includes a multiyear rate plan, decoupling and earnings sharing mechanisms along with metrics and PIMs,[38] but some jurisdictions may call a rate-making framework "PBR" even though it only has two or three of those elements.

In the modern context, PIMs are sometimes discussed as a method for transforming the utility business model away from one focused on capital investment to one focused on the needs of customers and public policy requirements. However, performance incentives and penalties have long been a part of the regulator's toolkit. In the past, if utilities met

[35] In a relevant sense, this is merely an extension of the typical incentive created by the necessary period of time that elapses between rate cases, sometimes known as "regulatory lag." The implementation of trackers and adjustment mechanisms that adjust utility revenues between rate cases undercut this incentive.

[36] For a recent discussion of totex rate-making concepts and practical implementation issues in the United States, see Goldenberg, C., Posner, D., Rebane, K., & Varadarajan, U. (2022, July). *Making the Clean Energy Transition Affordable: How Totex Ratemaking Could Address Utility Capex Bias in the United States.* Rocky Mountain Institute. https://rmi.org/insight/making-the-clean-energy-transition-affordable/

[37] Littell et al., 2017.

[38] Lowry, M. & Woolf, T. (2016, January). Performance-Based Regulation in a High Distributed Energy Resources Future. *Future Electric Utility Regulation, (3)*. Lawrence Berkeley National Laboratory. https://emp.lbl.gov/publications/performance-based-regulation-high

regulators' expectations, regulators had a variety of tools at their disposal to reward — or penalize — utilities. That included tools inside the rate-making process, such as prudence determinations, and outside the rate-making process, for example, by discussing possible upgrades to state statute with policymakers. In this light, metrics can be seen as an evolution of qualitative evaluations that have always taken place, particularly around the traditional utility obligations to provide safe and reliable service, and financial performance incentives can be seen as an evolution of a variety of judgments regulators have made within the rate-making process.

C. Considerations for Designing Effective Performance Incentive Mechanisms

Conceptually, there are three main elements in the design of a PIM.[39] First, the PIM must include a way to measure the performance outcome of interest. Second, the PIM must include a target, a series of targets or a sliding scale associated with levels of this metric. The relationship between the targets and the resulting measurements represents the level of performance by the utility. Last, the PIM must include a financial impact associated with the achievement or nonachievement of each target.[40] The financial impact could be positive for the utility, in the form of a reward, or negative, in the form of a penalty. As a practical matter, there is a wide range of potential pitfalls that poorly designed PIMs may suffer from, including bad metrics that are easily manipulated or targets that are too easy or difficult to achieve. Although all of these design elements are critical for the overall success of a PIM, we primarily concern ourselves in this paper with the financial aspects of the performance incentives.[41]

Various factors affect the efficacy of PIMs, as measured by a utility's achievement of performance goals set in their PIMs, many of which relate to its design.[42] A central challenge in designing effective PIMs is to create the appropriate incentive (or disincentive) to sufficiently encourage performance improvements. If the goal is to change utility behavior and generate public acceptance and appreciation for these changes, then financial incentive levels must be meaningful enough to motivate behavior but not so significant as to create concern among other stakeholders regarding their excessiveness,

[39] See Whited et al., 2015.

[40] There are four ways in which performance incentives are often calculated: shared net benefits, single-factor-based, multifactor-based or rate-of-return. Adapted from Nowak, S., Baatz, B., Gilleo, A., Kushler, M., Molina, M., & York, D. (2015, June). *Beyond Carrots for Utilities: A National Review of Performance Incentives for Energy Efficiency*. (Report U1504). American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/u1504. Since all of these approaches to calculating performance incentives ultimately compensate the utility for achieving or not achieving particular performance improvements, that compensation will flow to the utility's bottom line and positively or negatively affect their earnings level net of costs to achieve that performance level.

[41] Several reports discuss how to improve the efficacy of PIMs vis-à-vis improvements in metrics design and target setting. See Whited et al., 2015 or Goldenberg et al., 2022.

[42] There are also underlying regulatory circumstances that may affect a utility's motivation to strive for performance goals in PIMs. For example, utilities are likely to be more motivated where other utility business model incentives are well aligned with the PIMs, such as those for beneficial electrification (see Table 1). In addition, pairing PIMs with other regulatory reforms can be helpful for the achievement of the performance goal (e.g., decoupling mechanisms or lost revenue adjustment mechanisms for achievement of energy efficiency goals). For more information, see Gold, R., Myers, A., O'Boyle, M., & Relf, G. (2020, February). *Performance Incentive Mechanisms for Strategic Demand Reduction* (Report U2003). American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/u2003 or Goldenberg et al., 2022 and Nowak et al., 2015.

whether actual or perceived.[43] Thus, setting the incentive magnitude, either rewards or penalties, can be fraught with challenges. Consumer advocates oppose the unnecessary collection of additional revenue and may view potential rewards as excessive. Utilities fear either the risk of significant penalties or of lower and less predictable revenue streams. For these reasons and others, designing effective PIMs should be viewed as an iterative exercise with intentional, planned processes for improvement.

One approach to establishing the appropriate positive incentive level is to estimate the value realized from achievement of the performance goal and, through the use of cost-benefit analysis, determine the total net value, which can then be shared between ratepayers and shareholders.[44] This not only ensures that the costs to achieve the goal do not exceed the benefits, but also helps to identify the maximum net benefits that can inure to shareholders and ultimately limits how high the PIM should be set.[45] Such limits, while understandable in the context of a cost-benefit analysis, may result in PIMs that are too small to be effective at incentivizing utility behavior change. In addition, the desire to design PIMs whose incentive level is predicated on quantified cost-effectiveness assessments may create challenges to their efficacy when applied to some emerging performance areas, which focus on promoting innovation on the part of the utility.[46]

Historically, PIMs have been applied, if not designed, using current rate-making practices as the baseline, including existing practices for the authorized ROE. There has also been an unwillingness, particularly on the part of utilities and also sometimes on the part of policymakers, to allow the realized value of PIMs to represent a more significant share of utility earnings while also maintaining a reasonable total ROE by reducing the utility's base authorized ROE. To our knowledge, no state has meaningfully pursued this approach[47] or the inverse approach of setting authorized ROE at the highest level comfortable to regulators and setting meaningful, penalty-only PIMs that reduce ROE for failure to meet PIM targets. However, such a "revenue swap" approach could justify larger incentives — either rewards or penalties — while keeping the overall revenue requirement within a reasonable range and holding ratepayers financially harmless on net.

D. Experience with Performance Incentives

Regulatory efforts targeting improvements in utility performance began in earnest in the late 1970s and early 1980s. Motivating factors included reliability problems, sizable cost overruns in, and outright cancellation of, nuclear plant construction and, eventually,

[43] Littell et al., 2017.

[44] Whited et al., 2015, p. 46 ("In general, incentive payments should not exceed the net benefits to ratepayers.") Such a method could be used similarly to determine the sizing of penalties as well.

[45] State of Rhode Island Public Utilities Commission, Docket No. 4943, Guidance on April 11, 2019, regarding principles to guide the development and review of performance incentive mechanisms. http://www.ripuc.ri.gov/eventsactions/docket/4943-PIMs_Guidance_Document_Approved.pdf ("Incentives should be designed to maximize customers' share of total quantifiable, verifiable net benefits. Consideration will be given to the inherent risks and fairness of allocation of both cash and non-cash system, customer, and societal benefits.")

[46] Goldenberg et al., 2022.

[47] A modest version of this was implemented in the Rhode Island settlement with National Grid in 2018, in which the authorized ROE was reduced from 9.5% to 9.275% with the addition of positive-only PIMs. As discussed below, only one of those positive-only PIMs was approved by the RIPUC but the reduction in ROE remained (https://ripuc.ri.gov/sites/g/files/xkgbur841/files/eventsactions/docket/4770-4780-NGrid-ComplianceFiling-Book-1-through-7---August-16%2C-2018.pdf, p. 15).

widespread excess generation capacity.[48] These efforts started with mechanisms that sought to evaluate and compare utility performance on certain metrics to a desired outcome. The majority of the first performance incentive mechanisms were applied to the performance of a utility's generating units — namely, its heat rate and availability[49] — or to fuel costs and purchased power.

Over time, these yardstick approaches expanded to include reliability and customer service metrics, partly in response to utility cost-cutting measures, which were negatively affecting service quality during multiyear rate plans. These metrics focused on the achievement of goals specific to each utility, often using historical performance and engineering norms to develop performance targets. In the early 2000s, utility-specific performance incentives began to be used for demand-side management, particularly energy efficiency.[50] Subsequently, the use of PIMs as a tool to achieve a variety of regulatory and policy goals further expanded to include peak demand reduction, distributed energy resource (DER) integration and environmental performance, among others.[51]

Analyses of the effectiveness of PIMs are both rather limited and largely inconclusive. An early empirical analysis undertaken in 1991 suggests utilities with incentive mechanisms to improve generating plant utilization and heat rates did not significantly outperform their peers where these were absent.[52] However, another study in 2010 found that utilities with incentive plans promoting service quality improvements between 1993 and 1999 experienced shorter outages relative to utilities without such provisions.[53] Aside from these few limited studies, it does not appear that utilities undertook comprehensive reviews of the effectiveness of PIMs that focused on early outcomes, such as generator performance, reliability and customer service. At best, the research conducted to date suggests a mixed initial assessment of PIM efficacy.

Early analysis of energy efficiency PIMs, on the other hand, found that energy savings targets were consistently met, indicating a connection between the presence of a PIM and achievement of a savings goal.[54] Subsequent analysis found that although many states modified or fundamentally changed their efficiency incentive mechanisms in recent years, performance incentives continued to be associated with utilities making positive decisions

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48 Joskow, P., & Schmalensee, R. (1986). Incentive Regulation for Electric Utilities. *Yale Journal of Regulation, 4*(1), 1–51. https://openyls.law.yale.edu/handle/20.500.13051/8344

49 See, for example, the incentive for nuclear generation plant performance created by Colorado in the 1980s. Aggarwal, S., & Burgess, E. (2014, March). *New Regulatory Models*, 8–9. Energy Innovation.

https://energyinnovation.org/wp-content/uploads/2014/06/SPSC-CREPC_NewRegulatoryModels.pdf

50 The majority of shareholder incentives for energy efficiency emerged in this time frame, although at least one state (Connecticut) has had some type of utility performance incentive for demand-side management since 1988. Hayes, S., Nadel, S., Kushler, M., & York, D. (2011, January). *Carrots for Utilities: Providing Financial Returns for Utility Investments in Energy Efficiency* (Report No. U111). American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/u111

51 Whited, et al., 2015.

52 Berg, S. V., & Jeong, J. (1991, March). An Evaluation of Incentive Regulation for Electric Utilities. *Journal of Regulatory Economics 3*, pp. 45-55. https://doi.org/10.1007/BF00157610

53 Ter-Martirosyan, A., & Kwoka, J. (2010, July). Incentive regulation, service quality, and standards in U.S. electricity distribution. *Journal of Regulatory Economics, 38*, 258–273. https://doi.org/10.1007/s11149-010-9126-z

54 Hayes et al., 2011.

regarding energy efficiency programs.[55] For example, states with some kind of performance incentive for energy efficiency consistently spend more per capita on efficiency and achieve greater energy efficiency savings as a percentage of sales as compared to states without energy efficiency performance incentives.[56]

In recent years, as more states have adopted PIMs targeting emerging areas of utility regulation, including peak demand reduction, DER utilization and accomplishment of environmental goals such as emissions reductions, the experience with PIMs has likewise been mixed.[57] A 2018 assessment of the handful of existing PIMs incentivizing strategic demand reduction — measures targeted at reducing demand at specific times to optimize the electricity system — found that several PIM targets have been exceeded, while one was missed and data were unavailable for two.[58] Of course, this does not necessarily prove that these incentives did not encourage additional efforts on the part of the utility.

New York, one of the few states where multiple years of data are available for PIMs targeting both emerging and more traditional regulatory goals,[59] offers further evidence of mixed PIM effectiveness. More often than not, three New York IOUs (Consolidated Edison, Central Hudson Gas & Electric and National Grid) have either fully or overachieved performance compared to the target but sometimes have not met the minimum level of performance required to receive any incentive (see Table 1 on next page).[60] Again, whether the utility has achieved a particular performance level does not necessarily prove that an incentive worked as intended. A more rigorous assessment of PIM effectiveness would be helpful to determine whether these PIMs promote innovation on the part of the utilities, whether results were gamed by utilities and how well the PIMs deliver on societal goals. To our knowledge, no such assessment has been undertaken in New York or elsewhere, for that matter.

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[55] Nowak et al., 2015.

[56] Nowak et al., 2015.

[57] Goldenberg et al., 2022.

[58] Gold, R., Myers, A., O'Boyle, M., & Relf, G. (2020, February). *Performance Incentive Mechanisms for Strategic Demand Reduction* (Report U2003). American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/u2003

[59] Technically, these are called an Earnings Adjustment Mechanism (EAM) in New York. However, to maintain consistency and simplicity we have retained the more common term of PIM when referring to them.

[60] New York State, Department of Public Service. Consolidated Edison Company of New York, Inc. EAM annual reports for 2018 and 2019 in Case No. 16-E-0060 http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=16-E-0060&submit=Search

New York State, Department of Public Service. Consolidated Edison Company of New York, Inc. EAM reports for 2020 in Case No. 19-E-0065

http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=19-E-0065&submit=Search

New York State, Department of Public Service. National Grid EAM annual reports for 2018, 2019 and 2020 in Case No. 17-E-0238 http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=17-e-0238&submit=Search

Niagara Mohawk Power Corporation d/b/a National Grid for Electric Service. Central Hudson Gas & Electric EAM annual reports for 2018, 2019 and 2020 in Case No. 17-E-0459 http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=17-e-0459&submit=Search

Table 1. Percent of performance goals met, total incentive achieved and contribution to return on equity for PIMs in New York State 2018-2020

PIM categories	Consolidated Edison			Central Hudson Gas & Electric			National Grid		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
Coincident peak demand savings	100%	100%	100%	0%	0%	0%	100%	100%	45%
DER utilization	100%	100%	0%	0%	100%	100%	4%	0%	0%
Energy-efficiency savings	100%	100%	N/A	100%	100%	100%	39%	100%	100%
Energy intensity of residential customers	100%	0%	N/A	0%	0%	0%	69%	0%	0%
Energy intensity of commercial customers	0%	0%	N/A	0%	0%	100%	100%	33%	100%
Energy intensity of multifamily customers	34%	61%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beneficial electrification	N/A	N/A	TBD	100%	100%	100%	47%	100%	100%
Customer engagement	N/A	N/A	N/A	0%	0%	0%	N/A	N/A	N/A
Street lighting conversion	N/A	N/A	N/A	N/A	N/A	N/A	0%	65%	22%
Locational system relief value load factor improvement	N/A	N/A	0%	N/A	N/A	N/A	N/A	N/A	N/A
Total incentive Achieved ($M)	$27.2	$36.6	$11.61	$0.7	$1.6	$2.1	$11.3	$12.1	$12.2
Contribution to ROE	N/A	N/A	N/A	1.4%	3.0%	3.9%	6.4%	6.8%	6.9%

Note: Only outcome-based PIMs are reported. “N/A” means “not available,” which indicates that the utility did not have a PIM for this category or ROE values were unavailable. “TBD” indicates the result has not yet been reported by the utility for this category of PIM.

Other states have recently implemented or updated performance incentives, penalties and reporting metrics with the aim of changing utility behavior. While conclusive data regarding the effectiveness of these measures are not available, it is worth describing the approaches of several other states here.

Hawaii has a comprehensive performance-based regulatory framework that includes a portfolio of PIMs, including five new PIMs focused on outcomes of growing importance to the state: interconnection approval time, grid services acquired from DERs, renewable portfolio standard achievement, low-to-moderate income energy efficiency and utilization of advanced metering infrastructure. Data on the utilities’ performance on these PIMs are limited to 2021, which is the year that they went into effect. The utility exceeded the renewable portfolio standard PIM target by a modest 51,000 MWh, resulting in roughly a $1 million PIM award. One could conclude that the PIM structure is sufficient to motivate at least some utility action. However, the reward amount for this PIM declines quickly from $20/MWh in the first two years to $10/MWh after 2023, so data for further years will be needed to assess its overall effectiveness. The utility also exceeded the target goals for reducing interconnection time in 2021, resulting in roughly $2.8 million in rewards across the companies operating in Hawaii. This PIM structure also changes over time, with the targets becoming increasingly stringent. By 2025, the target thresholds for a reward are half the number of days that they were in 2021. Data are unavailable for two of the five PIMs, and utilities vastly underperformed on the advanced metering infrastructure utilization PIM, making further conclusions about Hawaii's new PIM structure premature.

Rhode Island has had PIMs in place for energy efficiency, reliability and customer service for some time. It has increased the allowed incentive for efficiency programs several times, while raising the achievement target required to receive the payment and has continued to achieve high levels of energy savings.[61] PIMs focused on power sector transformation (e.g., CO_2 reductions from electric vehicles, energy storage, DER interconnection) did not initially gain traction with the state's public utility commission. The commission rejected all but one out of seven PIM proposals brought to them in a 2018 National Grid electric rate case settlement. The approved PIM created a system efficiency incentive for annual MW capacity savings from certain eligible resources, with the net benefit split between the utility and customers. Early data indicate that the utility has been exceeding the targets, which could indicate that the targets were initially set too low or that the incentive has been particularly effective at motivating utility behavior. The targets are set to become more stringent over time.

The Illinois Commerce Commission (ICC) recently adopted PIMs and tracking metrics for ComEd and Ameren pursuant to Section 16-108.18(e) of Public Act 102-0662 (also known as the Clean Energy Jobs Act). That law required the commission to adopt such mechanisms, which will go into effect only if utilities opt to file multiyear rate plans. The statute requires that the total basis points rewards allocated to all performance metrics be symmetrically equal to the total penalties and also states that the total incentive for all metrics should be 40 basis points but may be adjusted as high as 60 or as low as 20 basis points for a particular multiyear rate plan period. In the first decisions issued in September 2022, the ICC approved 24 basis points for Ameren's performance metrics (split unequally among seven metrics) and 32 basis points for ComEd's performance metrics. In setting the performance incentives, the ICC is directed to consider "the extent to which the amount is likely to encourage the utility to achieve the performance target in the least-cost manner."[62] The ICC can adjust future basis point approvals to reflect this and other objectives.

The above examples lead us to again conclude that the experience to date with PIMs has resulted in mixed outcomes but that states continue to pursue new approaches, which provides an opportunity to assess effectiveness going forward.[63]

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[61] Goldenberg, C., Cross-Call, D., Billimoria, S., & Tully, O. (2020). *PIMs for Progress: Using Performance Incentive Mechanisms to Accelerate Progress on Energy Policy Goals*. Rocky Mountain Institute. https://rmi.org/insight/pims-for-progress/

[62] Illinois Legislature, 220 ILCS 5/16-108.18(e)(2)(F), 2022. https://www.ilga.gov/legislation/ilcs/fulltext.asp?DocName=022000050K16-108.18

[63] This is a rapidly evolving field where new jurisdictions have been taking steps toward a PBR framework at different paces. For example, Minnesota has employed a thorough process for developing metrics and PIMs. To date, the commission has approved 33 metrics, and Xcel Energy (the only utility currently operating under a multiyear rate plan, and thus the only utility with a metrics proceeding) has reported two years' worth of data. Some of Xcel's metrics have been tracked since prior to the PBR docket, and therefore there is more than two years'

III. Financial Foundations for Proper Incentive Mechanism Design

Current performance incentive mechanisms create possibilities for utilities to be more profitable if they perform in ways laid out by regulators, whether that is by reaping a financial reward or avoiding a penalty. This may have a financial feel to it, but profit as typically calculated in rate cases is still an accounting metric, not a financial one. Accounting conventions differ from financial concepts in key ways. Under accounting conventions, it is straightforward to report profit levels as a "rate of return," but typical accounting practices seldom incorporate market information on the cost of equity. As described by a group of respected finance professors, this can lead to substantial confusion.

> While acknowledging that equity capital has a cost, the accountant does not record it on the income statement because the cost must be imputed — that is, estimated. Because there is no piece of paper stating the amount of money [the company] is obligated to pay owners, the accountant refuses to recognize any cost of equity capital. Once again, the accountant would rather be reliably wrong than make a potentially inaccurate estimate. *The result has been serious confusion in the minds of less knowledgeable observers*.[64] (Emphasis added.)

Untangling this confusion can help us set up a better financial framework for incentive mechanism design.

Under typical corporate governance structures, executives are working for the utility's *present shareholders*. Discussion of "profits" for a utility is sometimes a useful shorthand, but a more accurate description of what shareholders want is long-term value maximization. This is well understood in the fields of finance and economics. As one microeconomics textbook puts it:

> If there is uncertainty about a firm's stream of profits, then instructing managers to maximize profits has no meaning…If the managers of a firm attempt to make the value of the firm's shares as large as possible then they make the firm's owners — the shareholders — as well off as possible. Thus maximizing stock market value is a well-defined objective function to the firm in nearly all economic environments.[65]

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worth of data for those metrics. So far, the commission has not adopted any PIMs related to these metrics and has, in fact, rejected one PIM proposal from the utility related to load flexibility, stating that the incentive was not necessary to induce Xcel to pursue the load-flexibility pilots in question. In 2022, Maine passed a law that required the public utility commission to adopt minimum performance standards for major investor-owned utilities across four areas (https://www.power-grid.com/policy-regulation/maine-puc-sets-minimum-service-standards-for-utilities/). In addition, the Connecticut Public Utilities Regulatory Authority issued an order in April 2023 laying out a PBR framework (https://www.dpuc.state.ct.us/dockcurr.nsf/8e6fc37a54110e3e852576190052b64d/cb38ec58b74562198525899d004c2021/$FILE/210515-042623.pdf).

[64] Higgins, R. C., Koski, J. L,. & Mitton, T. (2019). *Analysis for Financial Management* (12th ed.), p. 28. McGraw-Hill Education.

[65] Varian, H. (2014). *Intermediate Microeconomics* (9th ed.), p. 366. W. W. Norton & Co.

One corporate finance text, after agreeing that stock price maximization is the proper objective, colorfully states that, "[p]rofit maximization makes no sense as a corporate objective."[66] If the objective of performance incentives is to align shareholders' interests with the public interest, then a clear understanding of the drivers of shareholder value is a prerequisite.

Annual accounting profits are one element of shareholder value, of course, but there are several reasons why they are not always a reliable indicator. Most simply, maximizing profits in a given year may come at the expense of activities and investments that will have a bigger net-present-value payoff for shareholders over time. However, it may also be the case that existing shareholders would prefer that a utility avoid certain capital investments because the payoff potential is too low. As we will discuss, the financial literature demonstrates that there was an 18-year period in the 1970s and 1980s when utilities that made additional capital investments, thus increasing their future accounting profits, produced lower stock market returns than the utilities that had lower levels of capital investments and thus slower growth in net earnings.

Properly understanding shareholder value rests on four key ideas. First, it is important to stress that the *ROE* and the *cost of equity* are two distinct variables, even though they are sometimes conflated in regulatory circles. Second, creation or destruction of overall utility shareholder value is driven primarily by the interaction of three key variables: the scale of utility investments, the achieved ROE for those investments relative to the cost of equity and the risk of those returns over time. Third, common regulatory practices over the past three decades have typically set utility returns on equity significantly in excess of any reasonable estimate of the cost of equity. This is manifested by utility stocks trading significantly above book value. Fourth, the ROE allowed in a rate case is a *policy* variable, not an exogenous financial variable. *Only by considering all these circumstances together*, including the relevant investment choices and risks faced by a utility, can those involved in utility regulation understand how an investor-focused utility executive should respond to a given set of performance incentives.

A. The Return on Equity and the Cost of Equity are Distinct

Corporate finance makes a sharp distinction between the ROE and the cost of equity. For any firms, regulated or unregulated, the ROE represents the returns that companies are expected to earn on their *books*, while the cost of equity represents the returns investors expect to earn on those same companies' *stocks*. Today, the cost of equity and the ROE metrics are both discussed in utility rate proceedings, but looking at the long arc of history, they entered regulatory practice at different times. The cost of equity is the relative newcomer, arriving in the 1970s with considerable force.[67] In contrast, the ROE had been discussed for decades before that and continues to be the ultimate return that regulators authorize. Over a half-century ago in his now-classic article, Stanford finance professor

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[66] Brealey, R., Myers, S. C., & Allen, F. (2006.) *Principles of Corporate Finance* (8th ed.), p. 24. McGraw-Hill Irwin.

[67] Gordon, M. J. (1974.) *The Cost of Capital to a Public Utility*. Michigan State University Press.

Ezra Solomon noted that at first blush these two measures of returns appear to be similar, which is misleading:

> Both carry the same label "percent per annum rate of return on investment," and the two are frequently used as if they were freely congruent and interchangeable measures of the same thing…Understanding that book rate measures [ROE] and DCF rate measures [cost of equity] are not different estimates of the *same* thing but rather estimates of *different* things should eliminate at least part of the confusion surrounding "rates of return on investment."[68] (Emphasis in original.)

Table 2 lists many of the conceptual differences between these two rates of return.

Table 2. Fundamental differences between the return on equity and cost of equity concepts

Characteristic	Return on equity	Cost of equity
Type of return	Accounting variable	Market expectation
Perspective	Utility	Investor
Source	Observable	Estimated
Reference	Financial statements	Expected returns on other companies' stocks
Relevant risks	Affected by many firm-specific risks	Affected by only a few systematic risks
Relation to stock price[A]	Positive correlation	Negative correlation

[A] These conclusions assume that all other factors are held constant.

Notice especially the last row. If all else is held constant, an increase in the ROE causes the stock price to rise, while an increase in the cost of equity causes it to decline. There is an intuitive explanation for this result. The ROE is what the company earns; *holding all else equal,* if the company increases its profitability, investors will see more value.[69] In contrast, the cost of equity is what investors can earn elsewhere, on stocks facing similar risk exposures. Again, holding all else equal, an increase in the cost of equity reduces the value of the company in question, as some investors may see more value in holding the other stocks. That an increase in one variable increases the stock price, while an increase in the other causes the stock price to decline means that they then cannot be the same variable.

This important conceptual distinction has been recognized in treatises on utility regulation.[70] Alfred Kahn explained some important implications of this distinction in 1970. For example, a higher rate of return for a utility will not necessarily make stock purchases more attractive for new investors because the purchase price per share will

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68 Solomon, E. (1970.) Alternative Rate of Return Concepts and Their Implications for Utility Regulation. *Bell Journal of Economics, 1*(1), 65–81. https://www.jstor.org/stable/3003023

69 If the ROE is still below the cost of equity, the firm will continue to destroy value if it invests *new* capital. But the value of the existing assets will rise with the increased return.

70 Kahn, 1970 and Phillips, C. F. Jr. (1988.) *The Regulation of Public Utilities,* pp. 375–379. Arlington, VA: Public Utilities Reports.

likely be bid up to reflect any expectations of higher profits.[71] More generally, Kahn argues that it is impossible to give "new purchasers of stock more than the cost of capital, except by changing the rules after they have made their purchases."[72] This would be the case if capital markets are reasonably efficient and investors incorporate currently available information into the price they are willing to pay for shares in a utility corporation.[73]

Unfortunately, much of the confusion about these different returns that Solomon identified in 1970 has persisted. Utility commission orders typically suggest that the returns on equity they set are (roughly) equal to the cost of equity, and often treat the terms as synonyms, despite the clear conceptual distinction described above and associated empirical evidence supporting this distinction. Because many commissions do not distinguish between the cost of equity and ROE, the entire corporate finance structure, the one that reveals the potential for investor value creation to be reflected in utility stock prices, becomes obscured to the point that researchers in this field cannot untangle what regulators are actually doing. In 1994, Myers and Borucki concluded that, while regulators claimed to be setting returns on equity at the cost of equity, the two researchers could find no evidence to support that assertion.[74] Rather, they found that authorized returns on equity exceeded properly estimated costs of equity "for virtually all utilities."[75] This suggests that regulators have either incorrectly estimated the cost of equity or have misstated what the cost of equity truly represents. More recently in 2019, Carnegie-Mellon University researchers Rode and Fishbeck concluded, after investigating four decades of industrywide authorized returns on equity:

> 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.[76]

If regulators actually had been setting returns on equity at the properly estimated cost of equity, as frequently claimed, then such authorized returns would not be excessive. They conclude their review of regulatory decisions by figuratively throwing their hands in the air, referring to accepted industry rate-of-return-setting practices as a paradox, which is an appropriate term:

> In the end, we may observe simply that [when setting returns on equity] what regulators *should* do, what regulators *say* they're doing, and what regulators *actually* do may be three very different things.[77] (Emphasis in original.)

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[71] Kahn, 1970. Vol. 1 at p. 52, fn 79.

[72] Kahn, 1970. Vol. 1 at p. 52, fn 79.

[73] Rubenstein, M. (2001). Rational Markets: Yes or No? The Affirmative Case. *Financial Analysts Journal, 57*(3), 15–29. https://www.jstor.org/stable/4480313

[74] Myers, S. C., & Borucki, L. (1994.) Discounted Cash Flow Estimates of the Cost of Equity Capital. *Financial Markets, Institutions, and Instruments, 3*(3), 9–45. https://www.brattle.com/insights-events/publications/discounted-cash-flow-estimates-of-the-cost-of-equity-capital/

[75] Myers & Borucki, 1994.

[76] Rode, D. C. & Fischbeck, P. S. (2019, October). Regulated equity returns: A puzzle. *Energy Policy, 133*, 110891, p. 1. https://www.sciencedirect.com/science/article/pii/S0301421519304690

[77] Rode & Fischbeck, 2019, p. 16.

This is a recurring and unresolved problem, one which stands in the way of effective incentive mechanism design. Properly clarifying these issues should help tease out the underlying problems and point toward solutions.

B. The Drivers of Shareholder Value

Investor-focused firms, including regulated utilities, attempt to maximize their stock prices to benefit existing shareholders, who own the company.[78] One model of stock price formation is the residual income model.[79] It provides the clearest exposition of the factors going into the value-creation process:[80]

$$P = BV + \frac{(r-k)BV}{k-g}$$

In this constant-growth version of the model, P is the current per-share stock value, BV is the most recent accounting book value per share, r is the expected achieved ROE,[81] k is the cost of equity and g is the long-run sustainable growth rate. The ROE and the cost of equity are two of the key drivers of value, but examining either in isolation tells us nothing about the value of the stock. If we inspect the second term on the right, we see that it is the difference between the ROE and the cost of equity ($r - k$) that determines whether a stock trades above, at or below book value and whether capital growth adds to, subtracts from or has no influence on the stock price.[82] This reflects the central theme of investor value creation as described in the opening line of McKinsey & Co. experts' text, *Valuation: Measuring and Managing the Value of Companies*:

> The guiding principle of business value creation is a refreshingly simple construct: companies that grow and earn a return on capital that *exceeds* their cost of capital create value.[83] (Emphasis added).

It should be clear that present shareholders gain from capital investment only if the ROE is higher than the cost of equity, and indeed, that assumption is built into the classic Averch-Johnson paper on capital bias (A-J effect).[84] If the return on capital equals the cost of raising it, then value is neither created nor destroyed by investing capital. While the utility does not harm its present investors by investing under such conditions, neither does it help them. If the cost of capital is higher than the rate of return, then new capital investments can actually reduce shareholder value. See callout box on next page.

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78 This is a generally accurate representation of U.S. corporate law and is also built into most modern financial analyses for investor-owned utilities. See, e.g., Gordon, 1974, p. 3 ("We may assume that the objective of a utility management in its investment and other decisions is to serve the company's owners—its present stockholders.").

79 This version of the residual income model applies to firms in general if they are in a steady state, sustainable growth position. Advanced versions are available for firms in different stages of expansion.

80 See Koller, T., Goedhart, M. & Wessels, D. (2020.) *Valuation: Measuring and Managing the Value of Companies*. p. 3. Wiley.

81 Note that achieved ROE can differ from authorized ROE because many variables can change, notably sales and costs.

82 Fairfield, P. (1994.) P/E, P/B and the Present Value of Future Dividends. *Financial Analysts Journal, 50*(4), 23–31. https://www.jstor.org/stable/4479758

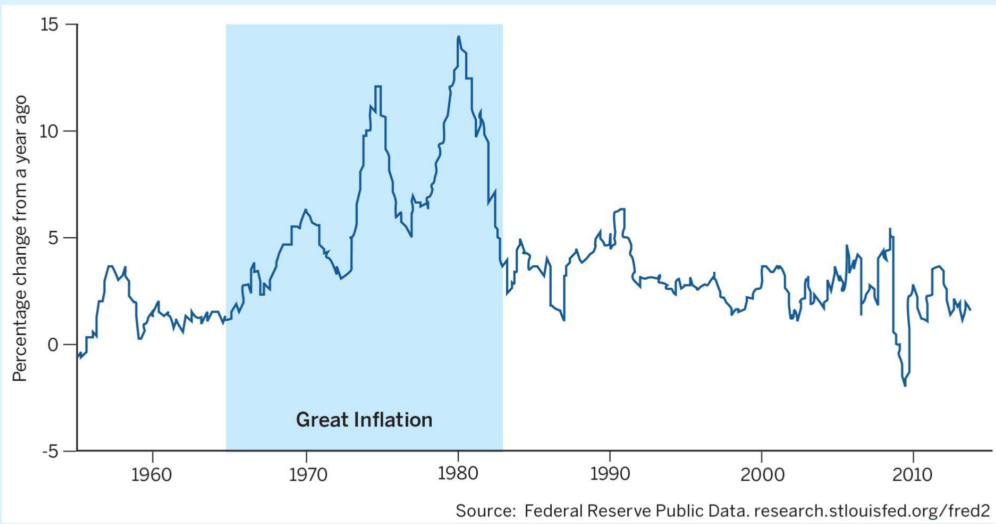
83 Koller et al., 2020.

84 Averch & Johnson, 1962.

When Higher Accounting Profits Led to Lower Shareholder Value

A Goldman Sachs investment strategist, writing in the *Financial Analysts Journal,* showed that over the period of 1969 to 1987, utilities with the fastest growth in reported earnings per share produced significantly lower stock returns (dividends plus stock price appreciation) than the utilities that had the slowest earnings per share growth.[85] This period is the exception in that returns on equity were lower than costs of equity in many of the years, which demonstrates why a singular focus on profits can lead utilities in the wrong direction if they are looking out for their investors. The negative relationship between accounting profits and shareholder returns over this period was not a coincidence. It was the very action that caused profits to rise — investment in *profitable* utility plant — that caused stock prices to decline. This is because over this period on average the cost of equity for utilities was higher than the returns on equity they earned. The reason for this, in most cases, was simply that inflation was rising, as were costs of equity and debt in order to keep up with inflation, so that even the allowed return from the previous rate case was not enough to satisfy investor expectations. As seen in Figure 2, this era is referred to as the "Great Inflation" period.[86]

Figure 2 Inflation as measured by the consumer price Index



The utilities that grew the most at that time were investing capital that earned a return that, though positive, fell short of investor requirements. In some years during this time period, investors could earn double-digit returns on risk-free Treasury securities. This pushed required returns on riskier utility stocks (and thus the cost of equity) well above both the allowed returns and the returns utilities actually earned on their invested capital.[87] Under this condition, the more equity capital the utilities invested, the more their accounting profits (which depend on *r*) grew, but the more their shareholder value (which depends on the difference between *r* and *k*) declined. The problem the utilities faced at that time was that while investing in new facilities was profitable, it was not *profitable enough* to satisfy investors who had opportunities to earn higher returns on other investments at the same or lower risk level. Utilities that were able to avoid making large investments saw stronger stock price performance, even though it did not show up as higher profits on their accounting books.

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85 Jones, R. C. (1990). Designing Factor Models for Different Types of Stock: What's Good for the Goose Ain't Always Good for the Gander. *Financial Analysts Journal, 46*(2), 25–30. https://rpc.cfainstitute.org/en/research/financial-analysts-journal/1990/designing-factor-models-for-different-types-of-stock-whats-good-for-the-goose-aint-always-good

86 Bryan, M. (2013, Nov. 22). *The Great Inflation 1965–1982.* Federal Reserve History. https://www.federalreservehistory.org/essays/great-inflation

87 In addition to the ROE, the interest rates on utility debt rates rose following inflation, and utility rate cases were decided based on actual existing debt, which averaged less than the incremental cost of debt.

Furthermore, other simple and intuitive implications can be derived from this formula. Shareholders may prefer a high-capital-growth scenario with a lower ROE to a scenario with a higher ROE and lower capital growth. Of course, that would only be the case if the lower ROE was still higher than the cost of equity and further depends on the relative differences between the returns on equity and rates of capital growth across the two scenarios. We provide a numerical example of that in subsection D below.

Even if the rate of return is higher than the cost of capital, that is not sufficient to benefit new investors. In a point echoing the analysis from Alfred Kahn above, Higgins et al. state that:

> It is not enough for investors to find companies capable of generating high ROEs, these companies must be unknown to others, because once they are known, the *possibility of high returns to investors will melt away in higher stock prices*. [88] (Emphasis added.)

As long as financial markets are reasonably efficient, the price of a stock will reflect investor expectations of future net earnings, and increasing those net earnings, through a higher approved ROE in a rate case or other means, should increase the stock price — thus benefiting existing investors but not necessarily new ones. Thus, a higher ROE makes those existing investors wealthier through an increase in the stock price.[89] From a corporate governance perspective, it makes sense that utilities advocate for higher returns on equity because utility executives work for the existing investors, not for potential capital providers.[90] When selling new shares of stock, utility executives are at arm's length to the new investors and the executives want those new investors to pay as much as possible for those shares. The higher the price, the lower the expected return to the new investors and the greater the wealth accumulation for the existing shareholders. In this way, the new investors and the existing investors participate in a zero-sum competition for the allocation of value creation from new utility investment. The more that goes to new investors, the less that is available for existing investors and vice versa.

C. Recent Regulatory Practices Have Set Return on Equity Significantly Higher than Cost of Equity

There is a substantial body of evidence that indicates that utility returns on equity have been set significantly above the cost of equity for the past three decades. This has been demonstrated in the academic studies previously by Rode and Fischbeck in 2019 and Myers and Borucki in 1994, but this result can be replicated with evidence from today. This evidence can be separated into two categories. The first is derived from the residual income model described above and the relationship between the book value of utility assets and the market valuation of the companies, as reflected in stock prices. The second is derived from the capital asset pricing model and the relative risk of utility companies compared to the market as a whole. Even with recent increases in inflation and interest

88 Higgins et al., 2019, p. 56.

89 Myers, S. C. (1972.) The Application of Finance Theory to Public Utility Rate Cases. *Bell Journal of Economics and Management Science, 3*(1), 58–97. https://www.jstor.org/stable/3003071?origin=crossref

90 In addition, utility executives are sometimes substantial shareholders in the enterprises they run.

rates, reasonable cost-of-equity estimates for utilities tend to fall between 6% and 8%, not the 9–10% range frequently seen for the ROE in recent rate cases.

As mentioned above, a straightforward result of the residual income model is that a utility's stock will trade at a price above its book value per share, which is what has been observed in the financial market for decades, only if the utility's rate of return is higher than its cost of capital. This is explained by finance professor Aswath Damodaran in his book *Investment Valuation*:

> The price-book value ratio of a stable firm is determined by the differential between the return on equity and its cost of equity. If the return on equity exceeds the cost of equity, the price will exceed the book value of equity; if the return on equity is lower than the cost of equity, the price will be lower than the book value of equity.[91]

Following this line of argument, Leonard Hyman, the former head of utility stock research at Merrill Lynch, noted in 2017 that "[f]or most of our recent history, utility stocks have sold at prices far above book value."[92] According to Hyman's analysis, he states that the price of utility stocks have only declined below book value for 14 years since 1945, the vast majority of which were in the 1970s and 1980s. He then argues that utility regulators should improve their techniques for setting the rate of return in rate cases.[93]

This result can be easily replicated with publicly available information, including filings made by utilities in rate cases. In a 2022 rate case filing made jointly by Wisconsin Electric Power Company and Wisconsin Gas, collectively known as We Energies, testimony from the utility-sponsored witness on the cost of capital included a selection of IOUs argued to reasonably represent companies facing similar risk.[94] Using this utility-selected portfolio, it is possible to collect data on the earned ROE and the price-to-book value for each company (see Table 3 on next page).

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[91] Damodaran, A. (2012, April). *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset* (3rd ed.) p. 515. Wiley.

[92] Hyman, L., & Tilles, W. (2017, Nov. 27). T*he Problem With U.S. Utility Regulation*. Oil Price. https://oilprice.com/Energy/Energy-General/The-Problem-With-US-Public-Utility-Regulation.html .

[93] Hyman & Tilles, 2017.

[94] Bulkley, A. (2o22, April 28). Testimony on behalf of Wisconsin Electric Power Company, p. 42. Wisconsin Public Service Commission, Docket 5-UR-110. https://apps.psc.wi.gov/ERF/ERFview/viewdoc.aspx?docid=436146

Table 3. Current utility financial characteristics

Company	2019-2021 median earned return on equity[B]	Price to book[C]
ALLETE	7.6%	1.30
Alliant Energy	10.8%	2.43
Ameren Corp	10.2%	2.33
American Electric Power	10.7%	2.14
Atmos Energy	8.5%	1.87
Avista Corp	6.8%	1.40
Black Hills Corp	9.1%	1.68
CMS Energy	13.6%	2.99
Duke Energy	8.0%	1.75
Edison International	5.5%	1.68
Entergy Corp	12.1%	1.92
Evergy Inc.	7.8%	1.61
Eversource Energy	8.6%	1.97
IDACORP	9.3%	1.99
New Jersey Resources	11.3%	2.56
NextEra Energy	10.2%	4.15
NiSource	10.2%	2.16
Northwest Natural Gas	7.9%	1.78
NorthWestern Corp	8.0%	1.32
ONE Gas	8.8%	2.25
Otter Tail Corp	11.1%	2.81
Portland General	9.0%	1.63
South Jersey Industries	9.0%	2.00
Southern Co	12.4%	2.75
Spire Inc.	7.9%	1.51
Xcel Energy	10.2%	2.44
Median	**9.1%**	**1.98**
Inner quartile range[D]	**8.0% to 10.2%**	

[B] As reported by the Value Line Investment Survey (http://www.valueline.com/) . Value Line releases staggered quarterly industry reports the 1,600 stocks it follows. Electric Utility East, Electric Utility Central and Electric Utility West segments are reported separately at three distinct times within each quarter. The latest report for each utility as of July 2022 was used for this analysis.

[C] Data as of July 15, 2022, Yahoo Finance (https://finance.yahoo.com/).

[D] The inner quartile range contains the model 50% of the data in rank order.

We can observe returns on equity directly; costs of equity are always implied and must be estimated. But the table above speaks loudly because both the ROE and the price-to-book are observable — nothing needs to be estimated with those variables. If utilities were on average earning their costs of equity, utility stock prices would trade at or near the underlying book values. Though we cannot view the cost of equity directly, finance principles make it clear that the cost of equity must lie substantially below the reported returns on equity, with utility stock price-to-book value ratios exceeding 2.0 in many cases.

While these price-to-book ratios provide significant evidence, another line of analysis that comes from the CAPM provides similarly consistent evidence that returns on equity have been set significantly higher than the cost of equity. The CAPM suggests the following formula for estimating a company's cost of equity:

$$k_i = r_f + \beta_i(k_m - r_f)$$

Where:

k_i = cost of equity for company i r_f = risk free interest rate

β_i = sensitivity of the stock of company i to broad market movement

k_m = cost of equity for market in general

This shows that there are three key parameters needed to estimate a company's cost of equity. One of these is broadly noncontroversial, because the spot yield on the 10-year U.S. Treasury bond is viewed as a reliable indicator of the current risk-free interest rate for investors. On March 1, 2023, that was approximately 4%. The cost of equity for the market in general has more complexity, but a variety of financial analysts produce reasonable estimates of the cost of equity for the stock market (e.g., the S&P 500) on a regular basis. Table 4 shows several of these estimates from consulting firms, financial analysts and a finance professor. The average of these five estimates is 8.8%, and the estimate ranges from 7.8% to 9.5%.

Table 4. Market cost of equity estimates from independent experts (Spring 2023)

Source	Market cost of equity estimate
McKinsey & Co.	9.5%[E]
Kroll (formerly Duff & Phelps)	9.5%[F]
Professor Damodaran (NYU)	9.3%[G]
J.P. Morgan	8.0%[H]
BlackRock	7.8%[I]

E Adds 7% to long-term inflation rate (https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/markets-versus-textbooks-calculating-todays-cost-of-equity)

F (https://www.kroll.com/-/media/cost-of-capital/kroll-us-erp-rf-table-2022.pdf)

G Five different estimates for equity risk premium, averaged the five estimates and added 4% risk-free rate (https://pages.stern.nyu.edu/~adamodar/)

H 4% equity risk premium, added 4% risk-free rate (https://www.morganstanley.com/assets/pdfs/2d9493c3-822f-4f18-8c28-ba3ad25e8473.pdf)

I Central expected return for U.S. large-cap equities (https://www.blackrock.com/institutions/en-us/insights/charts/capital-market-assumptions)

The actual cost of equity for a specific firm is frequently referred to as the "risk premium" over the risk-free interest rate. Once we know the risk-free rate and the cost of equity for the S&P 500 (the difference between the two is the equity risk premium for the market), then we need an estimate of beta to create a CAPM estimate of a utility cost of equity. This parameter measures the sensitivity of an individual stock to changes in the value of broad market portfolios, such as the S&P 500. Firms with high beta coefficients accentuate broad market changes and therefore create higher than average risk for portfolio investors. In contrast, stocks with low beta coefficients attenuate those broad market changes and are lower-risk holdings because they moderate value impacts. Utilities have beta coefficients less than 1 because their stocks have typically been countercyclical, showing more strength than average when there is an economic downturn.[95] Because its beta is lower than 1, a typical utility cost of equity should be bounded between the risk-free interest rate of 4% and the cost of equity of 9.2% for the S&P 500. Estimates typically range from 0.50 to 0.90.[96] We use a utility beta of 0.75 for illustrative purposes below.

In a working paper published in October 2022, UC Berkeley researchers Karl Dunkle Werner and Stephen Jarvis examined the approved ROE for utilities in gas and electric rate cases over the past 40 years and compared them to several different bond yield benchmarks.[97] This analysis shows that, while approved returns on equity dropped along with interest rates in the 1990s, approved ROEs stopped following interest rates on their continued downward trajectory from 2000 to 2020. In 2000, the implicit risk premium over 10-year Treasury bonds revealed by this data is approximately 5 percentage points. But by 2020, this same differential grew to nearly 8 percentage points. And as indicated by Figure 3 (next page),[98] nearly all approved ROEs are above a reasonable S&P 500 estimate of 8–9% — which is inconsistent with the concept that a utility's beta should be lower than 1.

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95 Breyer, S. (1982). *Regulation and Its Reform*, p.47. Harvard University Press.

96 For example, Alta Vista Research produces sector-specific SPDR reports within the S&P 500. A recent utilities sector estimate of beta is 0.56 (https://www.sectorspdrs.com/SectorResearchUpload/GetPdfDocumentByFullName?category=Sector%20Documents&subcategory=XLU%20-%20Utilities%20Documents&title=AltaVista%20Research)

97 Dunkle Werner, K., & Jarvis, S. (2022, September). *Rate of Return Regulation Revisited*. Energy Institute at Haas. https://haas.berkeley.edu/wp-content/uploads/WP329.pdf . See also Borenstein, S. (2022, Oct. 3) *What Does Capital Really Cost a Utility?* Energy Institute at Haas. https://energyathaas.wordpress.com/2022/10/03/what-does-capital-really-cost-a-utility/

98 Figure reproduced from Dunkle Werner & Jarvis, (2022).Data sources for original figure:

Regulatory Research Associates. (2021). *Rate Case History*. S&P Global Market Intelligence. https://platform.marketintelligence.spglobal.com/web/client?auth=inherit#industry/pastRateCases?Type=1

Moody's. (2021). *Moody's Seasoned Aaa Corporate Bond Yield*. FRED, Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/AAA

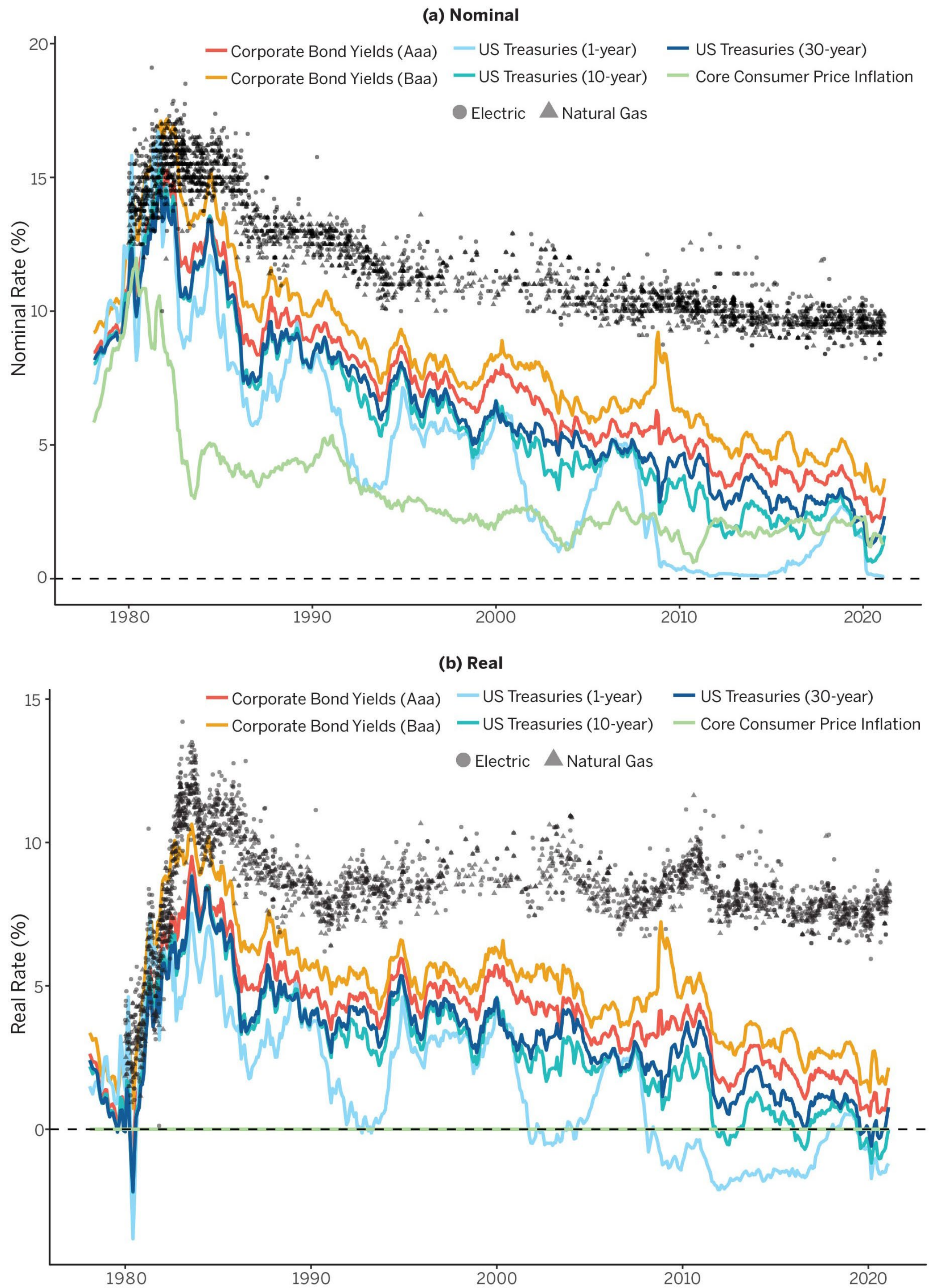
Moody's. (2021). *Moody's Seasoned Baa Corporate Bond Yield*. FRED, Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/BAA

Board of Governors of the Federal Reserve System. (2021). *1-Year Treasury Constant Maturity Rate.* FRED, Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/GS1

Board of Governors of the Federal Reserve System. (2021). *10-Year Treasury Constant Maturity Rate.* FRED, Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/GS10

Board of Governors of the Federal Reserve System. (2021). *30-Year Treasury Constant Maturity Rate.* FRED, Federal Reserve Bank of St. Louis. https://fred.stlouisfed.org/series/GS30

Figure 3. Return on equity and financial indicators: Nominal and real



Notes: These figures show the approved return on equity for investor-owned US electric and natural gas utilities. Each dot represents the resolution of one rate case. Real rates are calculated by subtracting core CPI. Between March 2002 and March 2006 30-year Treasury rates are extrapolated from 1- and 10-year rates (using the predicted values from a regressing the 30-year rate on the 1- and 10-year rates).

Sources: Regulatory Research Associates (2021), Moody's (2021a, 2021b), Board of Governors of the Federal Reserve System (2021a, 2021b, 2021c), and US Bureau of Labor Statistics (2021).

Reproduced from Dunkle Werner, K., & Jarvis, S. (2022). *Rate of Return Regulation Revisited*

Like Rode and Fischbeck in 2019 and Myers and Borucki in 1994, Dunkle Werner and Jarvis conclude that utility commissions are not typically setting the ROE at the cost of equity but instead significantly higher, incurring billions of dollars of extra costs for consumers every year.[99] Using this same data set and regression methodology, Dunkle Werner and Jarvis also find evidence that a higher ROE leads to an increase in the size of the rate base, one possible version of capital bias.[100]

Furthermore, it is relatively straightforward to construct simple estimates for the actual cost of equity using publicly available data.[101] For example, returning to the CAPM above, we can use the 10-year U.S. Treasury bond's spot yield of 4% as our risk-free rate and our average S&P 500 cost of equity of 8.8% as our general market cost of equity. We only need an estimated beta. If we use a utility beta of 0.75 as an illustrative example, that yields:

$$k_i = 4.0\% + 0.75(8.8\% - 4.0\%) = 7.6\%$$

A similar result can be obtained using reasonable inputs for the DCF model. One version of this model finds the following relationship:

$$k_i = \text{current dividend yield} + \text{long term sustainable dividend growth rate}$$

The current dividend yield for the typical utility is 3.2%. Long-run gross domestic product growth is an outer-bound estimate of the growth rate for any company, and today that rate is typically assumed to be about 4.5%. So here we obtain an estimated DCF cost of equity for a utility that is close to the CAPM estimate:

$$k_i = 3.2\% + 4.5\% = 7.7\%$$

A range of options is clearly reasonable, and more sophisticated versions of the models might produce different figures. But if rational assumptions are used, they would almost certainly be in the same ballpark.

Seeing such cost-of-equity estimates lower than current rate-making practices will, of course, raise many questions in the minds of regulators, commission staff and other stakeholders. One set of issues typically raised in rate cases revolves around risks to a utility's revenue and is frequently invoked to assert that higher risks for the individual utility will drive up the cost of equity. However, from the perspective of a major institutional investor with a diversified portfolio — those whose trades typically determine stock prices — only a narrow category of risks really matters for an individual utility; namely, those that cannot be diversified away across that portfolio. This is one of the fundamental insights of the capital asset pricing model:

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99 Dunkle Werner & Jarvis, 2022, p. 5.

100 Dunkle Werner & Jarvis, 2022, p. 5.

101 These illustrative calculations were formulated in the first quarter of 2023, using data available at the time.

> The CAPM is based on the idea that not all risks should affect asset prices. In particular, *a risk that can be diversified away when held along with other investments in a portfolio is, in a very real way, not a risk at all*. The CAPM gives us insights about what kind of risk is related to return.[102] (Emphasis added.)

This is one of the backbones of modern corporate finance, but it tends to be underplayed in regulatory proceedings. Items that receive much attention in regulatory proceedings, such as potentially stranded costs related to early retirement of coal plants or gas assets, though potentially devastating to a utility in terms of its individual stock price, will get diversified away in a portfolio. Those issues, the ones perhaps most important to utility CEOs, are of little concern to portfolio managers. Every firm in the entire economy faces these sorts of potentially devastating firm-specific risks, but none of them affects any company's cost of equity because good news for some offsets bad news for others. The cost of equity is not about the potential changes in the price of the company's stock (the individual company view) but its contribution to the value of the portfolio when macroeconomic conditions change (portfolio manager's view). These are two very different perspectives, but when determining the cost of equity, only the portfolio manager's view matters.

On the whole, we believe this is persuasive evidence that utility returns on equity have been systematically set significantly above the cost of equity in recent decades and that this continues today. This can be reasonably viewed as imposing unnecessary costs on consumers, but determining the utility cost of equity is not necessarily the final word in the determination of a reasonable ROE to use in rate-making.

D. Evaluating Performance Incentives in Context

Investor-focused utility executives want to create value for their shareholders. By observing *all the factors* that drive their stock prices, one can better understand how to properly incentivize them. Authorized returns on equity, along with any performance incentive revenue, are perhaps the most obvious potential sources of achieved earnings. As discussed above, changes in sales and expenses will also impact a utility's bottom line between rate cases. However, corporate efforts to achieve the regulator's performance goals may lead to ancillary benefits that would cause the stock price to rise even higher than suggested by the earnings opportunities alone or ancillary costs that put downward pressure on the price.

But the comprehensive picture of shareholder value must include risks, returns and the scale of investment.[103] A larger investment with a lower ROE can still be more valuable than a smaller investment with a higher ROE. This means that only looking at the achieved ROE for an investor-owned utility can be misleading — just as we demonstrated earlier that a focus on accounting profits can be misleading as well. Achieved returns on equity

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[102] Perold, A. (2004.) The Capital Asset Pricing Model. *Journal of Economic Perspectives, 18*(3), 3. https://www.aeaweb.org/articles?id=10.1257/0895330042162340

[103] For a comprehensive analysis of the investor valuation process for utilities, see Kihm, S., Cappers, P., Satchwell, A., & Graffy, E. (2018). Corporate Finance and Sustainability: the Case of the Electric Utility Industry. *Journal of Applied Corporate Finance, 30*(1), 106–111. https://doi.org/10.1111/jacf.12283

can also be misleading because they do not necessarily account for the risks facing a company.[104] Two firms could earn exactly the same 9% ROE, and one could be creating value for investors by investing capital, while the other could be destroying it, even though both would be increasing their accounting profits. Truly, any metric besides the stock price can be misleading.

The issues this poses for evaluating performance incentives can be illustrated with an example where the business-as-usual scenario is one where a vertically integrated utility continues to rely on utility-owned resources versus a decentralized scenario where the utility is required to rely on increased levels of customer-owned distributed energy resources. In the business-as-usual scenario, the utility earns a ROE of 9.5%, reinvests 37% of its net earnings into new capital investment and has a cost of equity of 7.8%. In the decentralized scenario, the utility continues to receive a ROE of 9.5% in its rates but will only need to reinvest 20% of its net earnings into new capital investment. This allows the utility to pay out proportionately more of its earnings to shareholders as dividends but limits its financial growth potential. Because the utility's ROE is higher than the shareholder's cost of equity, the shareholder would prefer the utility to make additional capital investments and create shareholder value instead of paying back dividends in the present — as long as the additional capital investments are allowed to be put into rates.

In our hypothetical, the state utility commission recognizes this basic conundrum. As a policy matter, the commission prefers the decentralized scenario to the business-as-usual scenario. But the commission would like to know how large an incentive it would need to offer to make the utility and its investors neutral across these two scenarios. The commission has asked a financial analyst to evaluate two potential principles for determining the size of an incentive: (1) a 100-basis point incentive that lasts for five years and (2) an incentive that keeps the utility share price at the same level as today. These scenarios can be evaluated using the residual income model described above, which is shown in Table 5.

Table 5. Utility stock prices by scenario

Scenario	Return on equity years 1 – 5	Return on equity years >5	Earnings investment rate	Cost of equity	Stock price
Business-as-usual scenario (faster capital growth)					
Business-as-usual	9.5%	9.5%	37%	7.8%	$41.90
Distributed-energy scenario (slower capital growth)					
Proposed 100 basis point incentive	10.50%	9.5%	20%	7.8%	$39.96
Incentive necessary for equalized stock price	12.0%	9.5%	20%	7.8%	$41.90

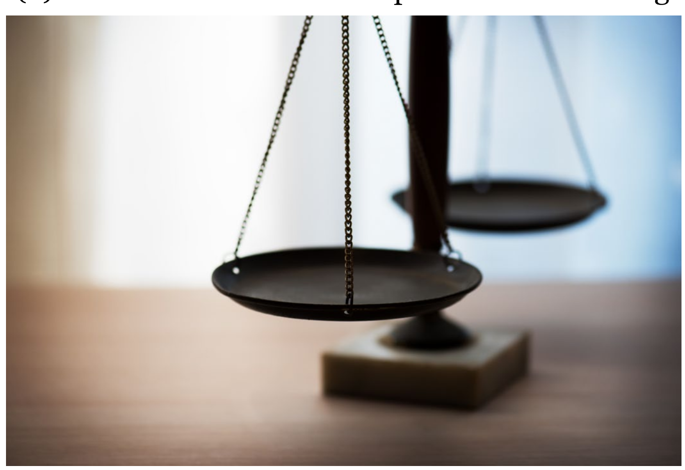
104 Company-specific risk will affect the stock price of a company, but it will not affect an investor's required return and thus does not affect the cost of equity.

Under the business-as-usual case, its stock price would be $41.90 per share. If investors thought the utility would move to the distributed energy future while earning a 100-basis point incentive for five years, its stock price would immediately *decline* to $39.96 per share, a 5% reduction. To make the utility's shareholder indifferent with an equalized stock price, an incentive must be much higher — a 250 basis point increase to 12.0%. If we use only the ROE as the guide, any bonus return would look attractive to the company. That is not the case, however, if we correctly look at stock price as the primary criterion relevant to utility management and its shareholders.

To be clear, it is not always the case that a low-return, high-growth path maximizes shareholder value. Whether it is depends on the specific levels of the various drivers of investor value. If the annual return-on-equity bonus to be awarded over each of the next five years were raised to anything higher than 250 basis points, then the high-return, low-growth scenario would be preferred. Of course, reducing capital growth is not the only way that a utility can necessarily improve performance. Shifting among different kinds of capital investments is another potential scenario that would need to be considered, as well as cases where more straightforward increases in operational expenses or capital investments improve the relevant performance. Furthermore, this hypothetical is dependent on the assumption that the low-return, high-growth path still has a ROE that is significantly in excess of the cost of equity, both during the five-year incentive plan and thereafter.

IV. Legal Constraints on Utility Business Model Reform

Reforms to IOU rate-making, notably including any implementation of a lower baseline ROE or potential penalties, must meet all of the relevant substantive and procedural legal requirements to survive judicial scrutiny.[105] While these requirements vary from state to state, there tends to be a common core of two substantive requirements: (1) the statutory "just and reasonable" standard and (2) the federal constitutional prohibition on taking private property without just compensation — known as the "Takings Clause."[106] Federal judicial precedent on these issues has not directly addressed the reforms we are considering in this report but it provides some general takeaways that put indicative boundaries on the range of legally permissible reforms.



[105] See generally Hempling, S. (2021). *Regulating Public Utility Performance: The Law of Market Structure, Pricing and Jurisdiction* (2nd ed.), Chapter 6. American Bar Association. https://www.americanbar.org/products/inv/book/413437227/

[106] Additionally, some state constitutions may have provisions similar to the Fifth Amendment of the United States Constitution.

The first point is that the "just and reasonable" standard does not provide much in the way of a judicial ceiling on how generous a compensation mechanism, including incentives of various kinds, can be to a utility. The second point is that there is a constitutional minimum to how low approved utility revenue, and thus the ROE, can go under the Takings Clause. Such a minimum, although itself subject to caveats and exceptions, must provide the utility a reasonable opportunity to earn a fair rate of return on capital invested in the enterprise, which comes with three criteria: (1) creditworthiness, (2) comparability and (3) capital attraction. In the early part of the 20th century, the law on takings in price-regulated industries was heavily contested but since the 1940s has been more settled.[107] Four key constitutional principles can be drawn out that are important to the reforms under consideration in this report:

1. The "end result" of the rates set and the "overall impact" on utility investors is what matters, and there is substantial flexibility in the methods that can be utilized by utility regulators.
2. The standard for returns comparable to other companies with similar risks reflects a look across the economy and does not direct a more strict or limited comparison with companies of the exact same type.
3. The standard for "capital attraction" is consistent with the notion that there is a range of permissible returns and that a constitutional minimum for a reasonably well-managed utility might be a return that merely compensates investors for the risks they are taking and nothing more.
4. Shareholders do not receive absolute protection from the consequences of poor management or adverse changes in markets.

Within these legal parameters, regulators can craft different rate-making solutions and reforms can be examined for compliance with these legal principles, either individually or as a package.

A. Statutory "Just and Reasonable" Standard

The standard that rates must be "just and reasonable" — or conversely, that "unreasonable and unjust" rates are declared to be unlawful — has been used in several federal statutes regulating electric utilities,[108] gas companies[109] and railroads[110] and in numerous state

[107] See, e.g., Federal Power Commission v. Hope Natural Gas Co., 320 U.S. 591 (1944). https://supreme.justia.com/cases/federal/us/488/299/ and Duquesne Light Co. v. Barasch, 488 U.S. 299 (1989). https://supreme.justia.com/cases/federal/us/488/299/

[108] Federal Power Act of 1935, now codified at 16 U.S.C. §824d, "All rates and charges made, demanded, or received by any public utility for or in connection with the transmission or sale of electric energy subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful." https://uscode.house.gov/view.xhtml?req=(title:16%20section:824d%20edition:prelim)

[109] Natural Gas Act of 1938, now codified at 15 U.S.C. §717c, "All rates and charges made, demanded, or received by any natural-gas company for or in connection with the transportation or sale of natural gas subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges, shall be just and reasonable, and any such rate or charge that is not just and reasonable is declared to be unlawful." https://www.govinfo.gov/content/pkg/USCODE-2021-title15/pdf/USCODE-2021-title15-chap15B-sec717c.pdf

[110] Interstate Commerce Act of 1887, "All charges made for any service rendered or to be rendered in the transportation of passengers or property as aforesaid, or in connection therewith, or for the receiving, delivering, storage, or handling of such property, shall be reasonable and just; and every unjust and unreasonable charge for such service is prohibited and declared to be unlawful." https://www.archives.gov/milestone-documents/interstate-commerce-act

regulatory statutes.[111] This standard has been described as properly integrating a wide range of different perspectives and interests, including those of consumers as well as the investors in the relevant regulated entity.[112] As a result, judicial opinions widely describe this standard as encapsulating a "zone of reasonableness" where rates and the resulting revenue levels are permissibly legal.[113]

Judicial opinions widely describe this [just and reasonable] standard as encapsulating a "zone of reasonableness" where rates and the resulting revenue levels are permissibly legal.

This provides broad authority for regulatory commissions to balance the relevant concerns without judicial second-guessing. A federal D.C. Circuit court of appeals case from 1984 did hold that the Federal Energy Regulatory Commission (FERC) violated the "just and reasonable" standard under the Interstate Commerce Act by being too generous toward the regulated oil pipelines. However, this case shows how much leeway a regulatory agency has before a court will make such a finding. FERC set maximum rate ceilings that the court found to be "far above the 'zone of reasonableness' required by the statute" and relied upon market forces to keep prices otherwise in check.[114] As a result, the court concluded that "[w]e believe this apologia for virtual deregulation of oil pipeline rates oversteps the proper bounds of agency discretion under the 'just and reasonable' standard."[115]

It is rare that regulatory agencies are found to overstep their discretion in this particular manner. This is illustrated in two more recent D.C. Circuit cases that explicitly considered bonus incentives for electric transmission lines.[116] In 2004, that court upheld a 200 basis point incentive for PG&E to upgrade certain important transmission corridors in California, finding that noncost considerations, such as increasing the supply of energy, were valid considerations in setting rates.[117] In 2010, that court upheld a bonus incentive

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111 For example, New York Public Service Law, Article 4, §65 states, "All charges made or demanded by any such gas corporation, electric corporation or municipality for gas, electricity or any service rendered or to be rendered, shall be just and reasonable and not more than allowed by law or by order of the commission. Every unjust or unreasonable charge made or demanded for gas, electricity or any such service, or in connection therewith, or in excess of that allowed by law or by the order of the commission is prohibited." https://www.nysenate.gov/legislation/laws/PBS/65

112 Federal Power Commission v. Hope, 320 U.S. 591, 603 (1944). ("The rate-making process under the [Natural Gas] Act, i.e., the fixing of "just and reasonable" rates, involves a balancing of the investor and the consumer interests."). https://supreme.justia.com/cases/federal/us/488/299/

113 See, e.g., Permian Basin Area Rate Cases, 390 U.S. 747 (1968). p. 767 ("Moreover, this Court has often acknowledged that the Commission is not required by the Constitution or the Natural Gas

Act to adopt as just and reasonable any particular rate level; rather, courts are without authority to set aside any rate selected by the Commission which is within a 'zone of reasonableness.' FPC v. Natural Gas Pipeline Co., 315 U. S. 575, 585. No other rule would be consonant with the broad responsibilities given to the Commission by Congress; it must be free, within the limitations imposed by pertinent constitutional and statutory commands, to devise methods of regulation capable of equitably reconciling diverse and conflicting interests.").

114 Farmers Union Cent. Exchange v FERC, 734 F.2d 1486, 1501 (1984). https://casetext.com/case/farmers-union-cent-exchange-v-ferc

115 More specifically, after examining the legislative history and statutory scheme, the court concluded that market pricing combined with a high price ceiling could not satisfy the just and reasonable standard without showing that "market forces could be relied upon to keep prices at reasonable levels throughout the oil pipeline industry." Farmers Union Cent. Exchange v FERC, 734 F.2d 1486, 1507 (1984).

116 Neither of these two cases involved a challenge under the "just and reasonable" standard but rather related to administrative law challenges related to the rationality of the incentives and FERC's reasoning.

117 Public Utilities Commission of California v. FERC, 367 F.3d 925, 929 (D.C. Cir. 2004). https://casetext.com/case/public-utilities-comn-of-calif-v-ferc-2

for transmission upgrades in New England completed by Dec. 31, 2008. The court disagreed with several specific contentions challenging this incentive, finding that (1) the relevant standards did not require demonstration of a causal link to specific actions by utilities in response to the incentive and (2) no "de facto cost-benefit analysis" was necessary to compare the incremental costs and benefits of the incentive.[118] The court found that a general link between the utility's financial motivations in the face of such an incentive for completion of projects by a given deadline was sufficient.[119]

Of course, utility regulators themselves are allowed to provide more scrutiny to incentive schemes, and state courts may treat the "just and reasonable" standard in a state statute differently. But these cases generally illustrate the principle that courts will provide significant leeway and deference to a determination by utility regulators that incentives will further their desired public policy goals.[120]

B. Constitutional Prohibition on Confiscatory Rates

In contrast, the Takings Clause has led to a substantial body of litigation regarding whether rates set by utility regulators are so low that they violate the U.S. Constitution and are thus "confiscatory."[121] In the landmark case Federal Power Commission v. Hope Natural Gas Company, the U.S. Supreme Court held that utility regulators are not bound to any particular rate-making formula, further elaborating that "[i]t is not easy but the impact of the rate order which counts. If the total effect of the rate order cannot be said to be unjust and unreasonable, judicial inquiry under the [Natural Gas] Act is at an end."[122] This holding was reaffirmed in an opinion written by Chief Justice Rehnquist in the 1989 case, Duquesne Light Co. v. Barasch.[123] One key implication of these holdings is that it is

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118 Connecticut Department of Public Utility Control v. FERC, 593 F.3d 30 (D.C. Cir. 2010), p. 34–36. https://casetext.com/case/conn-dept-of-pub-utility-ctrl-v-ferc

119 Connecticut Department of Public Utility Control v. FERC, 593 F.3d 30 (D.C. Cir. 2010), p. 34–35. https://casetext.com/case/conn-dept-of-pub-utility-ctrl-v-ferc

120 Such deference is not unlimited of course, and courts have reviewed and overturned decisions by FERC and state public utility commissions on the grounds that they were not supported by substantial evidence, (California Public Utilities Commission v. FERC, No. 20-1388 (D.C. Cir. 2021) or Tejas Power Corp. v. FERC, 908 F.2d 998 (D.C. Cir. 1990)), were arbitrary and capricious (TransCanada Power Marketing Ltd. v. FERC, No. 14-1103 (D.C. Cir. 2015)); or failed to meet requirements for reasoned decision-making more generally (Massachusetts Attorney General v. Massachusetts Department of Public Utilities, (Appeals Court, Lawyers Weekly No. 81-171-20, 2020)).

121 This constitutional prohibition has been found to be identical to the lower bound of the zone of reasonableness for the "just and reasonable" statutory standard. Federal Power Commission v. Natural Gas Pipeline Co., 315 U.S. 575 (1942), p. 315, U.S. 586. ("the Congressional [just and reasonable] standard prescribed by this statute coincides with that of the Constitution, and that the courts are without authority under the statute to set aside as too low any 'reasonable rate' adopted by the [Federal Power] Commission which is consistent with constitutional requirements.").

122 Federal Power Commission v. Hope, 320 U.S. 591, 602 (1944). While Hope was technically decided under the "just and reasonable" statutory standard, the lower bound for "just and reasonable" rates was found to be identical to the constitutional prohibition on takings two years previously in *Natural Gas Pipeline Co.*. See previous footnote. The Hope majority opinion itself cites the principle of flexibility of methods to *Natural Gas Pipeline Co.*, "We held in *Federal Power Commission v. Natural Gas Pipeline Co.*, supra, that the Commission was not bound to the use of any single formula or combination of formulae in determining rates." At least two subsequent Supreme Court decisions also explicitly recognized the constitutional implications of the Hope decision. In 1989, Chief Justice Rehnquist explained that "Forty-five years ago in the landmark case of FPC v. Hope Natural Gas, this Court abandoned the rule of *Smyth v. Ames*, and held that the 'fair value' rule is not the only constitutionally acceptable method of fixing utility rates." (Duquesne Light Co. v. Barasch, 488 U.S. 299 (1989), at 310. https://supreme.justia.com/cases/federal/us/488/299/

In addition, Justice Souter recognized that *Hope* had constitutional implications when writing for the majority in Verizon v. FCC, 535 U.S. 467, 483–484 (2002). ("In *Hope Natural Gas*, this Court disavowed the position that the Natural Gas Act and the Constitution required fair value as the sole measure of a rate base on which 'just and reasonable' rates were to be calculated.").

123 Duquesne Light Co. v. Barasch, 488 U.S. 299, 310 (1989). ("Today we reaffirm these teachings of *Hope Natural Gas*: '[I]t is not theory but

not the individual physical capital assets of the regulated entity that are protected from "takings" through rate regulation but rather the financial investment in the regulated entity.[124] As a result, utility rates must include payments for the cost of capital, along with reasonable measures of ongoing expenses, taxes and the depreciation of capital assets.[125] Within these general guidelines, there is substantial flexibility. For example, several different methods for calculating rate base have been explicitly permitted by the U.S. Supreme Court.[126]

Along the same lines, the U.S. Supreme Court has laid out general standards for a constitutionally permissible rate of return, albeit with further exceptions. While other parts of Bluefield Water Works v. Public Service Commission have likely been overruled, its standard for a rate of return has not: "The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions generally."[127] The majority opinion in Federal Power Commission v. Hope Natural Gas Co. goes on to say that "the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and attract capital."[128] This has been summarized as a three-pronged test: (1) comparability, (2) creditworthiness and (3) capital attraction.

As a constitutional matter, it seems clear that the "comparability" criterion is not intended to mean that an electric utility's return must be compared to the returns of other electric utilities. Bluefield Water Works v. Public Service Commission explained that "A public utility is entitled to such rates as will permit it to earn a return . . . equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures."[129] This is a general statement about

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the impact of the rate order which counts. If the total effect of the rate order cannot be said to be unreasonable, judicial inquiry. . . is at an end.'").

124 If a governmental entity literally seized and removed a utility capital asset, traditional Takings Clause protections would apply. However, economic regulation of utility rates raises a different set of questions. For that reason, Scott Hempling has analogized these questions around economic regulation and the Takings Clause to a separate line of Supreme Court cases known as "regulatory takings" doctrine, including Penn Central v. New York City, 438 U.S. 104 (1978). See Hempling, 2021, p. 265. However, to the knowledge of the authors, the U.S. Supreme Court has not explicitly made this link, and nor have other federal courts to date.

125 Justice Brandeis noted in concurrence in Southwest Bell Tel. Co. v. Public Service Commission of Missouri that protection for investors would be hollow if reasonable measures of other utility costs were not required to be covered in rates as well. Southwest Bell Tel. Co. v. Public Service Commission of Missouri, 262 U.S. 276, 291 (1923)

126 Historic original cost for the utility (Hope); average industry cost (Permian Basin 1967); total element long-run incremental cost (Verizon 2002); historic original cost of prudent investment, excluding investments that are not used and useful (Barasch 1989).

127 Bluefield Water Works v. Public Service Commission, 262 U.S. 679, 693 (1923).

128 Federal Power Commission v. Hope, 320 U.S. 591, 603 (1944).

129 Bluefield Water Works v. Public Service Commission, 262 U.S. 679, 692–693 (1923). https://supreme.justia.com/cases/federal/us/262/679/

business and credit conditions, not those specific to any one kind of utility or even utilities generally. This particular issue does not appear to have been extensively litigated but was part of a D.C. Circuit case in 1967. In TWA v. Civil Aeronautics Board, the airline tried to argue that an 8% return was impermissibly low by referencing returns higher than 10% for its competitors and often 12–15%. The court rejected these arguments for several reasons, including the fact that a range of returns could be reasonable, and the existence of higher returns for other companies can be explained by a variety of substantive and procedural considerations.[130] Along those lines, the idea that a range of rates of return could be reasonable has been touched upon many times in Supreme Court decisions, right alongside the idea that too low a rate of return would be confiscatory.[131] This implies that there is an approximate minimum acceptable rate of return and that it is permissible within the bounds of the just and reasonable standard, among other limitations, to have a higher rate of return for a variety of different reasons. As Justice Brandeis stated in concurrence in Southwest Bell Tel. Co. v. Public Service Commission of Missouri, "[t]he compensation which the Constitution guarantees an opportunity to earn is the reasonable cost of conducting the business. Cost includes not only operating expenses, but also capital charges. Capital charges cover the allowance, by way of interest, for the use of the capital, whatever the nature of the security issued therefor; the allowance for risk incurred; and more to attract capital. The reasonable rate to be prescribed by a commission may allow an efficiently managed utility much more."[132]

This implies that there is an approximate minimum acceptable rate of return and that it is permissible within the bounds of the just and reasonable standard, among other limitations, to have a higher rate of return for a variety of different reasons.

Of course, the question of what is required for a well-managed utility raises the related question of what is required for a poorly managed utility? It has long been established that it is constitutionally permissible to deny cost recovery in rates for any imprudent investments by utility management.[133] Furthermore, the U.S. Supreme Court has also established that regulated companies and their shareholders are not necessarily protected from changes in market circumstances, even if management decisions were reasonable along the way. In 1945, Market Street Railway Co. v. Railroad Commission held that "The due process clause has been applied to prevent governmental destruction of existing economic values. It has not and cannot be applied to ensure values or to restore values

[130] Trans World Airlines, Inc. v. Civil Aeronautics Board, 385 F.2d 648, 664 (D.C. Cir. 1967). https://casetext.com/case/trans-world-airlines-inc-v-cab-2

[131] Of course, several times the Supreme Court has explicitly held that a particular rate of return is unconstitutionally low, although many of these cases occurred in the early 20th century prior to the *Hope* decision in 1944.

[132] Southwest Bell Tel. Co. v. Public Service Commission of Missouri, 262 U.S. 276, 290–292 (1923). It is worth noting that Justice Brandeis's description of investor needs and financing principles may not be accurate 100 years later in 2023.

[133] In Duquesne v. Barasch, the U.S. Supreme Court found that the individual company prudent investment rule is permitted but not required. Duquesne Light Co. v. Barasch, 488 U.S. 299, 315 (1989). However, this principle dates back at least to Acker v. United States (1936), where the U.S. Supreme Court endorsed removal of "extravagant and wasteful" expenditures. Acker v. United States, 298 U.S. 426, 430–431 (1936).

that have been lost by the operation of economic forces."[134] More recently, in the 1989 Duquesne Light Co. v. Barasch case, changes in the prospects for nuclear power plant construction reasonably led to the cancellation of construction after the start of the project. In that case, the U.S. Supreme Court upheld the state's decision to exclude initially incurred costs on the grounds that the investment was not "used and useful" despite an explicit finding that the relevant management decisions were prudent. In the latter case, this was because the total revenue provided to the utility satisfied the Federal Power Commission v. Hope Natural Gas Go. "end results" test.[135] However, the Supreme Court did note that opportunistically switching methodologies to disadvantage investors could be suspect.[136]

V. Integrating Performance Incentives into Rates

How do we pull together the underlying policy issues, legal constraints and a modern and sophisticated understanding of investor incentives to find solutions that can (1) be a win for consumers, (2) better achieve public policy objectives and (3) provide net financial benefits for well-run utilities? To connect the legal and financial discussion, there is a straightforward argument that the constitutional minimum ROE for a well-managed utility in a stable industry would be a properly estimated market cost of equity. Once this legal threshold is cleared, whether regulators should set the numeric value of the ROE at the cost of equity is a matter of public policy, which includes issues that extend beyond finance of capital investments. We believe that Alfred Kahn stated the best way to approach these issues many years ago:

> Merely permitting all regulated companies as a matter of course to earn rates in excess of the cost of capital does not supply the answer; there has to be some means of seeing to it that those supernormal returns [$r > k$] are earned, some means, for example, of identifying the companies that have been unusually enterprising or efficient and offering the higher profits to them while denying them to others.[137]

An interesting qualitative example of this approach to setting a utility's ROE is described in a South Carolina water utility case on appeal to the state Supreme Court in 2021.[138] The Court upheld the decision of the South Carolina Public Service Commission to set the ROE at the lowest cost-of-equity estimate available on the record (7.46%), lower than any rate-of-return witness had specifically recommended.[139] The commission sent a signal to the

134 Market Street Railway Co. v. Railroad Commission, 324 U.S. 548, 567 (1945).

135 Duquesne Light Co. v. Barasch, 488 U.S. 299, 313–315 (1989).

136 Duquesne Light Co. v. Barasch, 488 U.S. 299, 315 (1989).

137 Kahn, 1970. Vol. 1, p. 54.

138 In re Application of Blue Granite Water Company for Approval to Adjust Rate Schedules and Increase Rates, South Carolina Appellate Case No. 2020-001283, Opinion No. 28055, Sept. 21, 2021. https://law.justia.com/cases/south-carolina/supreme-court/2021/28055.html

139 In contrast, an Arizona court of appeals held in March 2023 that an 8.9% baseline ROE was permissible but that a 0.2% reduction

utility that its performance was subpar and as a result the commission was providing the utility the lowest reasonable return. Importantly, the regulator still viewed this return as covering the cost of equity, but it was lower than the return other utilities were receiving in that jurisdiction.

Of course, outcome-based performance incentives offer the opportunity to institute this type of approach in a more systematic way that is transparent and predictable for the utility and other stakeholders but cannot and should not be separated from a broader discussion of the other incentives (writ broadly) that utilities face in rate-making specifically or regulation more generally. How best to accomplish that will be an ongoing conversation but we offer our thoughts here. In this section, we first lay out a guiding framework for integrating performance incentives into a multiyear rate plan with decoupling. We then discuss the general considerations that should influence the relevant policy choices with respect to setting the ROE with two illustrative examples, a rewards-only performance incentive model where the base ROE is set at the cost of equity and a penalty-only performance incentive model where the base ROE is set using current ROE practices.

A. A Guiding Framework for Integrating Performance Incentives

1. Estimate the Cost of Equity

As discussed in Section V, firms that achieve a ROE less than their cost of equity reduce shareholder value when they make new capital investments. Conceptually, the cost of equity can be viewed as a floor for a utility's authorized ROE, whereby it is meeting the bare minimum performance standards. As described above, the cost of equity is best thought of as an opportunity cost, where an investor is choosing to invest in a specific utility corporation instead of holding a diversified portfolio of economywide assets with a macroeconomic risk exposure similar to that faced by utilities.

While the theory is clear, parties in rate cases, and ultimately the regulators, must have a practical method to estimate this cost of equity. Several reasonable methods are available, such as DCF and CAPM approaches, that reflect plausible gross domestic product growth assumptions. However, models using recent returns on equity in any form as proxies for cost of equity, such as the comparable earnings method that merely references the authorized or achieved returns on equity of other utilities (a completely different variable) or that rely on overly optimistic long-term gross domestic product growth estimates, are not reasonable methods of estimating the cost of equity.

2. Set Base Revenue Levels

Integrating performance incentives into rate-making requires the calculation of the utility's overall cost of service, as in any other rate proceeding. As discussed in Section V, utility rates and revenue levels must be reasonably designed to cover each element of the

specifically for deficiencies in the customer service performance of Arizona Public Service, the state's major investor-owned electric utility, was not permissible under the Arizona Constitution provision tying rates to the "fair value" of public service corporations. Arizona Public Service Company v. Arizona Corporation Commission, No. 1 CA-CC 21-0002, Division One of the Arizona Court of Appeals. https://law.justia.com/cases/arizona/court-of-appeals-division-one-published/2023/1-ca-cc-21-0002.html utility's cost of service, including ongoing expenses and an appropriate return of and on capital investments. In the context of performance incentives, this portion of utility revenue — before the application of any performance incentives and penalties — can be conceptualized as the "base revenue level" for a given rate year. In a multiyear rate plan, this base revenue level needs to be set for every year, either as a specific dollar trajectory or by formula.

Of course, the ROE is one of many elements of the typical cost of service for a regulated utility. Setting the ROE at the properly estimated cost of equity would certainly be constitutionally permissible, meeting precisely the test laid out by Justice Brandeis of "allowance for the risk incurred." However, the ROE used to set rates or revenue levels need not be strictly limited to the cost of equity. Setting the ROE higher than the cost of equity has certain incentive properties that could be desirable in some contexts, particularly when public policy goals indicate that utilities should be seeking out capital investments to expand service. However, in most U.S. states today, where the ROE has been set considerably higher than the true cost of equity, this is more likely undesirable, as it leads to both capital bias and additional costs to ratepayers. Given the flexibility of the "end results" test from Federal Power Commission v. Hope Natural Gas Co., it should even be constitutionally permissible to choose a base revenue level that, while covering all other costs, effectively incorporates a base ROE that is *lower* than the reasonable cost of equity if the utility has a reasonable opportunity to earn sufficient additional revenue through positive performance incentives. For example, a set of PIMs that reflects outcomes that the utility could reasonably accomplish, at least in part, can be considered a "reasonable opportunity." Conversely, it should be possible to set up a system where the utility could be significantly penalized for failure to achieve certain outcomes, with a theoretical worst-case scenario of having achieved an ROE that is lower than the cost of equity. In this penalty case, the "reasonable opportunity" for the utility would be achieving a good enough performance to avoid the penalties, in whole or in part.

In this context, a utility will typically only receive performance incentive revenues or pay penalties once a rate year is over and the relevant performance data have been reported and evaluated, so there will be a lag. That is germane to the question of how to transition efficiently and fairly from a traditional rate-making model to a performance incentive system. The first rate-year of the new framework may have a different revenue structure, absent the impacts of incentive or penalties, from the subsequent rate-years when they are actually applied. Accordingly, this and other steps can be taken to smooth out both the variability in customer bills and utility revenues over time. However, to the extent that elements of the overall PBR policy include cost control measures, those will translate into immediate earnings improvements during the first rate-year if the utility achieves those cost reductions.

On Access to Capital

Some regulators may be concerned that lowering base returns on equity will restrict utilities' access to capital. That is another misconception. We present a dramatic nonutility example to show why this fear is unfounded for almost any established firm, utilities included. Alcoa, the aluminum producer, decided to raise equity capital in March 2009, during the Great Recession. Conditions were challenging. Alcoa was earning returns on equity near 2.0%, and it forecast a loss for 2009. Industry experts predicted low returns on equity in the early years. They turned out to be correct — Alcoa earned a median ROE of only 5.4% over the next five years. While it might have seemed to many that Alcoa would come up dry in its attempt to raise capital, it was not surprising to investment bankers that it raised the funds it needed. Investors willingly provided Alcoa with new capital. The company issued $900 million of common stock and another $400 million of bonds.[140]

How could Alcoa achieve this feat? It raised the capital not because it had great internal investment opportunities (it didn't), but rather because it sold its stock at a very low price (60% discount to book value), which converted meager returns on equity into attractive potential stock returns for new investors — at the expense of existing investors. Stock prices below book value inflate the influence of returns on equity to create higher returns for investors, which is the opposite of what happens when the stock price lies above book value.

We do not suggest that this is a rosy story for Alcoa; nor do we suggest regulators drive utilities to this position, which would occur if returns on equity were set well below the cost of equity. Our point here is that *access* to capital is not the concern; it can be raised under almost any circumstances. Wall Street doesn't decide who gets capital — rather, it prices capital so any firm that wants or needs it can get it. Firms might not like the price they can get for their securities, but that's a different issue. The conventional view in the utility regulatory arena is that capital is scarce and that many firms are turned away when they try to raise it. The evidence reveals that the opposite is true — under most conditions, capital has been and will continue to be plentiful, and essentially any firm that wants it can raise it. It's just that it's not free and that the price one pays for it might not always be what one expects.[141] Investment banks make money by providing capital to corporations, albeit on terms the investor views as favorable, not by denying firms access to it.

There is also anecdotal evidence that capital access is far from a problem for utilities today, even at low returns on equity. ComEd, the large Chicago utility, has had its ROE set by statute for many years (ROE = yield on 30-year Treasury bond + 580 basis points). Fitch, the rating agency, notes:

ComEd filed its 2021 distribution formula rate update on April 16, requesting a $51.2 million increase to distribution rates based upon a <u>7.36% ROE</u> and 48.70% equity capitalization.[142] (Emphasis added.)

Far from this relatively low return in comparison to many of its peer electric utilities being a cause for concern, Fitch rates Commonwealth Edison's bonds as "A," which is stronger than the bond rating of many of these same peer utilities. All of the evidence, including the track record of the industry, suggests that returns on equity in the neighborhood of current reasonable cost-of-equity estimates will create no capital access problems for utilities. Even utility rate-of-return experts acknowledge that utilities can raise and have raised capital with their stock prices below book value, just as Alcoa did.[143]

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[140] The Globe and Mail. (2009, March 16). *Alcoa to raise $1-billion through stock and debt issue*. https://www.theglobeandmail.com/report-on-business/alcoa-to-raise-1-billion-through-stock-and-debt-issue/article1150070/

[141] Mauboussin, M., Callahan, D., & Majd, D. (2016, October). *Capital Allocation: Evidence, Analytical Methods, and Assessment Guidance*. Credit Suisse. https://plus2.credit-suisse.com/content/getsourcedocument?Document_ID=1a8Rkn&format=pdf

[142] Fitch Ratings. (2021, August 5). *Fitch Rates Commonwealth Edison's First Mortgage Bonds 'A.'* https://www.fitchratings.com/research/corporate-finance/fitch-rates-commonwealth-edison-first-mortgage-bonds-a-05-08-2021

[143] Morin, R. (2006.) *The New Regulatory Finance*. PUR Books.

3. Identify Policy Goals, Prioritize Outcomes and Create Metrics

This step in the process is a precondition to any PIM proceeding, regardless of the underlying approach used to promote performance improvements. Defining the desired goals, translating those goals into specific outcomes and then developing quantifiable performance metrics is a sensible process that has been used in multiple jurisdictions.[144] The specifics of this process will inevitably and understandably depend on the current concerns of the regulators and the public policy goals of that jurisdiction. In most cases, this has been done in a separate proceeding in advance of any rate-making proceeding for several reasons. First, there are barriers to widespread participation in rate cases in many jurisdictions, so a separate proceeding can be designed to elicit feedback from a wide spectrum of viewpoints. Second, it can take time to develop rigorous data reporting standards for each metric that ensure the confidence of regulators, utilities and stakeholders. Furthermore, establishing a well-understood data baseline for each metric can be helpful in advance of the next step of establishing performance incentive formulas.

Table 6 (next page) provides a few illustrative examples of how a high-level goal can be translated into more specific outcomes, and then each outcome has one or more measurable criteria that can be tracked.

Table 6. Illustrative goals, outcomes and metrics

Goal	Outcome	Metric
Ensure affordable utility bills	Reduce number of customers in arrears	Track number of customers in arrears by ZIP code
Improve system reliability	Reduce customer outage frequency and duration	Track SAIDI and SAIFI by ZIP code
Advance public policy	Increase DER adoption levels	Track monthly distributed solar project interconnections in MW Track average total number of days to interconnect distributed solar projects

While there is no perfect answer for structuring metrics, the best practice is that outputs and outcomes that directly impact ratepayers, stakeholders and society at large, such as energy efficiency savings, affordable bills and emissions reductions, are ultimately the most important criteria to track. In contrast, utility inputs, such as dollars spent or hours of labor, can be relevant but are less well-suited to metric-based performance incentives because they have a tendency to focus utility efforts solely on optimizing the inputs, rather than accomplishing outcomes that benefit ratepayers and society.

[144] For example, Washington, North Carolina, Nevada, Illinois, Hawaii, Connecticut and Minnesota have undertaken processes along these lines. For Minnesota information, see: Minnesota Office of the Attorney General. (2017, Dec. 21). *In the Matter of a Commission Investigation to Identify and Develop Performance Metrics and, Potentially, Incentives for Xcel Energy's Electric Utility Operations: Initial Comments of the Office of the Attorney General*. Docket No. E-002/CI-17-401. Minnesota Public Utilities Commission. https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7BF0E82E68-0000-CF1F-93DB-4CE874187020%7D&documentTitle=20191-148970-01

The ultimate metrics tracked in each jurisdiction for each utility can be used in several different ways:

1. Reporting metrics — These metrics can be made publicly available and can be used as helpful information for stakeholders and as an ongoing monitoring tool for regulators and other policymakers.
2. Scorecard metrics —The reported data for each metric is matched with either a goal for utility performance improvement or ongoing comparisons across jurisdictions or utilities. Adding goals or comparisons is a nonfinancial mechanism for encouraging improved utility performance.
3. Performance incentive metrics — Setting a formula that ties the reported data to financial rewards or penalties for a utility provides a quantitative financial value for utility management and shareholders to improve performance.

It is to this last application of metrics, with a direct link to financial incentives or penalties, that we now turn.

4. Set Incentive Formulas

Care needs to be taken in designing both individual performance incentives and the overall package of performance incentives. To begin, there are numerous potential structures for a performance incentive or penalty based on a specific metric:

- All or nothing — the utility earns the reward if it hits the target or pays the penalty if it fails to meet the target.
- Scalable — the relevant incentive (or penalty) grows in magnitude with the level of success (or failure), often up to a maximum. The formula for this type of incentive can be linear or something more complex, such as quadratic.
- Deadbands — a middle ground result means that the utility receives no incentive and pays no penalty.
- Symmetric or asymmetric — the formula for the reward may or may not be the same as the formula for the penalty.

These different structural choices lead to numerous potential PIM designs.

The overall package of performance incentives, along with the determination for base revenue levels, defines the expected range of overall revenue levels for the utility from a given rate year. As described previously, any incentives paid to the utility or any penalties owed by the utility will typically be assessed on a lag. As a result, revenue impacts on the utility or bill impacts on ratepayers must be seen as multiyear streams. If a performance incentive framework is being newly established, the first rate-year will not include any incentives paid to or penalties paid by the utility, but subsequent rate-years will include the relevant incentives or penalties from the previous year. Ratepayer bill impacts and utility revenue impacts can thus be considered based on the actual revenue required in a given year, the total of the base revenue level from that year and the incentives or penalties from the previous year. If the utility meets or exceeds all of the relevant performance criteria, that defines the upper limit of the utility's potential revenue for the next year. If the utility fails to achieve the minimum level necessary for any incentives or fails badly enough to receive the maximum possible penalty, that defines the lower limit of the utility's potential revenue for the next year. Thus, the formulas for the performance incentives can be thought of as setting a band or range of potential revenue levels for the utility.[145]

Thinking about reasonable incentive and penalty levels in this broad context is not a simple endeavor. However, we suggest several principles for policymakers and stakeholders to consider:

- *Materiality*: Incentives and penalties must be significant enough to motivate changes to utility investments, operations and behavior.
- *Benefits commensurate with overall costs*: Overall bill impacts on customers should be justified by improved outcomes.
- *Constitutionality*: The utility must be provided its constitutionally guaranteed reasonable opportunity to earn a fair rate of return.
- *Clarity*: The process and formulas for setting performance incentives and penalties must be sufficiently transparent and understandable to gain the confidence of a broad set of stakeholders.

Within these general limits, the scope of potential solutions is vast and different arrangements will be preferred by different stakeholders.

B. Return on Equity as a Policy Choice

In discussing supernormal returns in the quote above, Alfred Kahn is talking about incentive rewards, not compensation for risk. Investors need return compensation only for exposure to macroeconomic risk factors; that is, full and complete compensation in that regard for the risks they face. Any return above the cost of equity is just that — a return premium, one having nothing to do with risk. Therefore, no cost-of-equity model can guide the regulator in setting return premiums because that component has nothing to do with risks of any kind. See Figure 4.

Figure 4. Components of the return on equity

Risk-free rate	3.0%	***Cost of equity***
Utility risk premium	4.0%	
Utility reward (incentive premium)	3.0%	
Return on equity	***10.0%***	

145 This description simplifies some potential aspects of a new revenue framework, including shared savings mechanisms.

Note that while the cost of equity is all about compensation for systematic risk, the ROE is a poor indicator of the risk that any firm, utilities included, faces. *Analysis for Financial Management* is explicit about that:

> The problem with ROE [return on equity] is *that it says nothing about what risks a company has taken to generate it*...In sum because ROE looks only at return while ignoring risk, it can be an inaccurate yardstick of financial performance.[146] (Emphasis added.)

Two firms could earn exactly the same 10% ROE and one could be creating value for investors by investing capital, while the other could be destroying it. This component-by-component decomposition shown above is essential if we are to understand the investor value creation process.

While estimating the cost of equity is all about applying sound economic principles, once the minimum return is established, then we are outside the realm of financial models. A ROE set as equal to the properly estimated cost of equity, if it can reasonably be expected to be earned, provides complete compensation for relevant macroeconomic risk to investors. Determining the proper ROE above (or potentially below) that minimum level is a more complicated policy matter — it considers the possibility of *return premiums*, not *risk premiums*. There are no ROE models for this — the finance models can estimate only the cost of equity. *As we move into the return-on-equity determination, issues of risk and the use of financial models must fade into the background*. Even finance experts agree with that. The fair ROE is ultimately one that balances investor and consumer interests, along with other public policy concerns, which is not a finance problem, as noted by MIT finance professor Stewart Myers.

> Finance and economics are not very helpful when the problem of regulation is framed as "consumers versus investors."[147]

This certainly bears on incentive mechanism design. We do not suggest a single policy (e.g., that it is fair that all utilities have returns on equity set *at* the cost of equity or that all utilities have returns set *above* that level, as has been the case for the past several decades). Rather, as a policy matter, *the fair return should vary from utility to utility to reflect performance,* subject to the relevant legal constraints.[148] As a legal matter, the cost of equity can be viewed as a floor for a utility's authorized ROE, whereby it is meeting the bare minimum performance standards. Relatedly, according to the Averch-Johnson model, setting the ROE at the cost of equity would be sufficient to eliminate the capital bias of a utility and it would not be necessary to reduce ROE anywhere near zero to counteract capital bias.[149]

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146 Higgins et al., 2019, p. 54.

147 Myers, 1972, p. 79.

148 It may be permissible to set the baseline ROE below the cost of equity (e.g., at the cost of debt or even lower) if the utility has a reasonable opportunity to earn more through performance incentives.

149 There may be other nonfinancial reasons that utilities prefer capital investment solutions, such as engineering simplicity. But these other nonfinancial reasons do not show up in financial models.

When determining the potential size of a performance incentive or penalty, the relative magnitude will likely determine the actions a utility will take to improve its performance, thus minimizing any penalties and maximizing the rewards. For the utility, however, this is a comparative calculation. Whether it is done formally or informally, the utility's management are evaluating the pros and cons of the relevant alternatives. Incrementally adding performance incentives of any kind — either penalties or rewards — should be able to shift the calculus of these utility decisions in the direction of those incentives. If increasing the incentive or decreasing the penalty has an accompanying cost (either a direct cost that would not be recovered through rates or else forgone revenue), then the utility's management would compare the benefits and costs of alternative actions. Crucially, the accompanying costs can often depend on the other aspects of the rate-making model. If the utility expects the return for a new capital investment to significantly exceed its incremental cost of capital, then it should require a larger countervailing benefit in order to forgo that new investment. That is the insight from the illustrative example given in Section III.D. However, if the utility expects the ROE for a new capital investment to be roughly equal to the cost of equity, then the necessary countervailing incentive to forgo that investment should be much smaller. This is the difference between pushing a boulder uphill and pushing a boulder on flat ground. The latter is much easier than the former. Of course, a reduction in capital investments is not the only (nor even the primary) goal of integrating performance incentives into rates. But this shows the importance of understanding the underlying incentives inherently built into a given rate-making model. The overall package of performance incentives can also push utility incentives in a particular direction in concert because certain utility actions may be beneficial for multiple metrics in a performance incentive framework. In addition, there may be a related shift in the culture of the utility, particularly if management gives discretion to employees to seek out new ways to improve utility performance.

While setting the size of performance incentives according to a benefit-cost analysis for each relevant outcome can be a reasonable path, it is not without its conceptual challenges. It does not consider whether and how the utility might be capable or willing to change its behavior in response to the incentives. Furthermore, assessing the costs and benefits of this innovation can be quite difficult, which can stymie the development and application of PIMs seeking to fundamentally alter the electricity marketplace. In many cases, costs are incurred in the short run, and benefits are less easily quantified or received over a longer period of years or even decades. To avoid the perception of overcompensating a utility for the achievement of performance goals, there may be a tendency to underestimate the value of achieving efforts to transform markets or to limit that estimation to near-term or easily quantifiable benefits.

In addition, the fact that the authorized ROE set in recent rate cases is higher than strictly necessary for finance or legal purposes provides an important source of flexibility to design innovative policies. A "revenue swap" approach, where current rate-making practices with a higher ROE are considered the baseline, can effectively provide for larger incentives without adversely affecting ratepayers on net. This can also be viewed as gradualism from a utility's perspective where we do not immediately transition from a ROE set using current methods (e.g., 9.5–10%) to a return set at the current cost of equity (7–8%). Such a revenue swap could be implemented using either a rewards-only approach, a penalties-only approach or a mixture of rewards and penalties. All of these approaches can be formulated in mathematically similar ways but operate from a different level of baseline revenue. As described in Figure 5 (next page), this is best considered as a multiyear revenue stream for the utility. Compared to a narrow benefit-cost approach to setting the magnitude of performance incentives, this type of approach — with incentives, either rewards or penalties — should encourage larger behavior changes for the utility.

Figure 5. Comparison of reward and penalty policies to traditional regulation

VI. Conclusion

To date, states have barely scratched the surface of the full range of performance incentive frameworks that could potentially be applied. Utility rates must include payments for the cost of capital, ongoing expenses, taxes and the depreciation of capital assets. But regulators have more flexibility in developing utility compensation frameworks than they perhaps realize, although in some jurisdictions statutory revisions may be necessary to implement certain reforms. Armed with a full understanding of all the factors that drive investor value, and thus motivate utility behavior, regulators can better understand how to properly incentivize utilities. A ROE set equal to the properly estimated cost of equity provides complete compensation for relevant macroeconomic risk. Determining the proper ROE above that minimum level — a return premium — is a more complicated policy matter. We argue that the fair return should vary from utility to utility to reflect performance.

We do not claim to know what the perfect formulation for performance incentives is or what utility business model reform more generally should look like. Every jurisdiction faces its unique set of challenges, for which unique solutions are needed. The full set of options described in Section II can reasonably be considered, which goes far beyond performance incentives. Rather, our aim has been to illuminate nuances about how shareholder value is maximized and, on the basis of that knowledge, to offer a framework and some approaches to PBR and PIMs that should have appeal.

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