

22 August 2018

# Incentive Regulation in the United States: Current Trends and a Look Back

By **Dr. Jeff D. Makholm,**  
**Dr. Laura T.W. Olive,** and  
**Max N. Luke**

The electric utility business is re-examining the way it deals with decentralization, digitization, and decarbonization—the “3 Ds” that have dominated discussions of the “Utility of the Future” initiatives coming out of scholarly energy research institutes, such as the Massachusetts Institute of Technology (MIT) Energy Initiative.<sup>1</sup> New York’s Reforming the Energy Vision (REV) and the United Kingdom’s Revenue = Incentives + Innovation + Outputs (RIIO) initiative are the most newsworthy of the fundamental reviews of the regulatory model. Several other North American jurisdictions, however, have recently taken up the challenge to re-examine their regulatory frameworks, including Canada’s reassessment of the structure and duties of its National Energy Board (NEB) and several state initiatives to review existing regulatory arrangements in an era of fast-moving technology and a heightened public policy push for more responsive and efficient energy utilities.

Expectations of change in regulatory arrangements are not coming exclusively from legislatures, regulators, and scholarly institutes. North American electric utility executives also see new types of incentive regulation in their future. Half of the respondents in one survey expect to face a mix of traditional cost-of-service regulation and incentive regulation in 10 years.<sup>2</sup> A large majority (about seven-eighths of respondents) believe the most appropriate utility regulatory model for the 21st century will be either (1) cost of service regulation with a mix of incentive regulation or (2) predominantly incentive regulation.

## **What Is Incentive Regulation?**

Regulators cannot compel investors to provide the capital to render public services; there must be a profit incentive for them. All regulation of investor-owned utilities is thus “incentive regulation.” The pertinent questions focus on the nature of those incentives, what institutions support them, and how they change over time. What is most interesting about incentive regulation is not its creation, but its almost continuous evolution. That evolution reflects two predominant arcs pertaining to two institutional rulebooks: (1) the century-old US rules

reflecting the works of Congress and Justice Louis Brandeis' Supreme Court and (2) the 20-year-old UK rules of Margaret Thatcher and the UK's first electricity regulator, Stephen Littlechild.

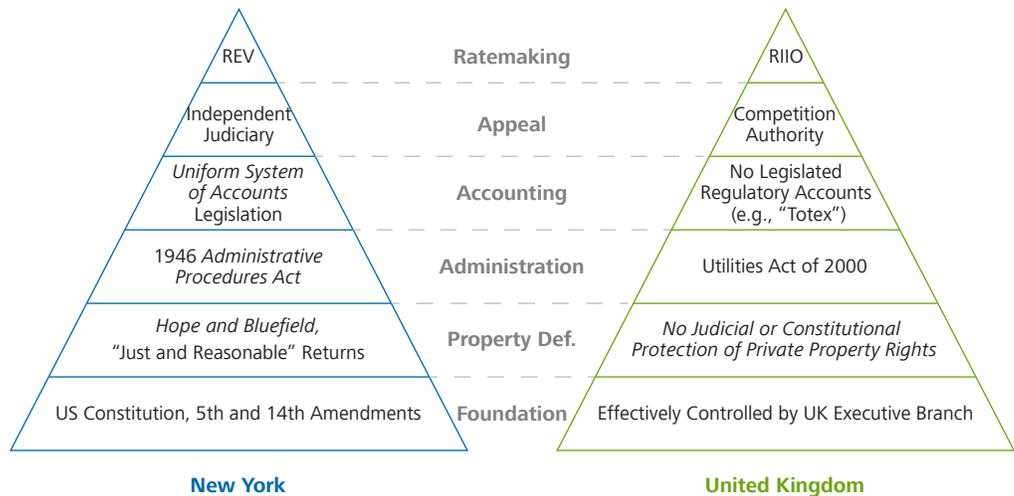
Those twin rulebooks describe quite different games—often confusing but highly familiar to NERA economists who have worked closely with both sets of rules since their adoption.

### Incentive Regulation 3.0: UK's RIIO and New York's REV

The current discourse on incentive regulation tends toward the UK's RIIO and New York's REV—acronyms known around the energy world. RIIO came out of Ofgem's desire, starting in 2013, to improve on a regulatory incentive formula after 20 years of experience with UK-style RPI-X regulation. Among other things, RIIO focused on common incentive treatment for capital investments ("capex") and operating expenses ("opex") in a unified metric called "totex" to blur the lines between the two types of spending and to more definitively measure desirable outputs for the utilities involved. REV, launched in 2014, was a similarly ambitious initiative to transform energy distribution and usage in New York State.

To a certain extent, REV followed RIIO in its pursuit of a "new regulatory model for the 21st century." Much of REV's early enthusiasm for RIIO was misplaced, for US regulation—in all important statutory, constitutional, accounting, and legal respects—is intrinsically different than UK regulation in major categories of accounting, administration, and constitutional rights to property. UK regulators have, simultaneously, much greater preemptory power and much less information than their US counterparts (in legislatively-directed standardized formats), upon which to direct that power. This is both a natural result of the much longer history of US regulation and the uniquely American common law method where the US Supreme Court stands as the ultimate authority on political economy in any regulatory dispute.

Figure 1. **The Institutional Foundations of REV and RIIO**

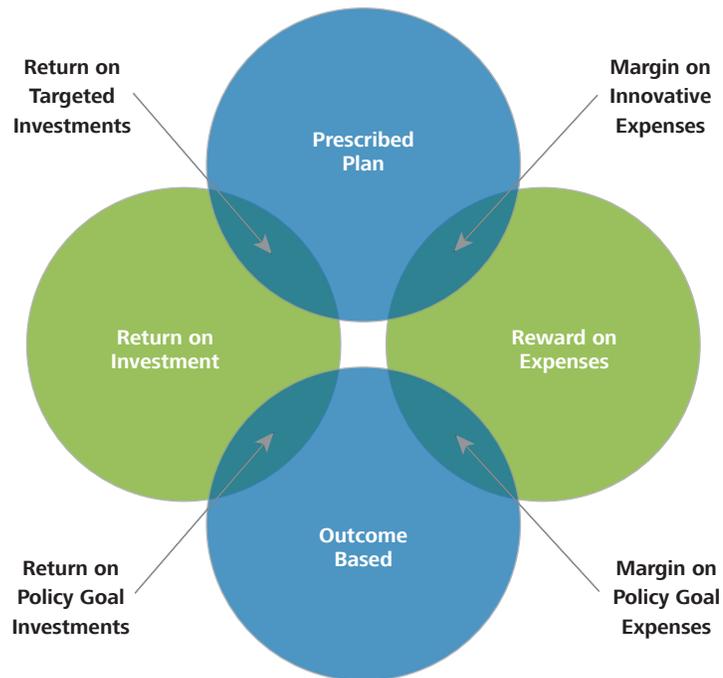


Neither RIIO nor REV has been an unalloyed success, but both have been working experiments in new types of incentive regulation, on both sides of the Atlantic. RIIO, which came first, introduced new methods of accounting, a new basis for forecasting revenues up to eight years into the future, and the ability for the UK regulator to judge how soon to permit owners to recoup new capital investments. RIIO targeted “capital bias”—the perception that energy utilities are only genuinely interested in capital investments upon which they earn a return. RIIO also targeted “information asymmetry”—the idea that investors, not regulators, have the information needed for efficient operating and economical ratemaking.

REV, an initiative of New York’s governor, came next. But while the governor’s initiative touted RIIO’s new methods, the actual impact on New York regulation has been relatively minor, involving some new pilot projects, but no major change in methods to match RIIO. US regulation already had methods for dealing with the long-understood conceptual problems of perceived “capital bias” and “information asymmetry.”

But within the wide scope of RIIO and the relatively narrow confines of REV, regulators have shown a willingness to develop new incentive-based methods to permit the capitalization of (or margins on) expenses or contracts that would otherwise have been treated as flow-through expenses.

Figure 2. **The Dimensions of Utility Performance Incentives**



Various opportunities for earning exist under the new incentive paradigm. Such methods provide either returns on approved expenses or retail margins on a range of approved activities. Regulators and utilities now envisage new earnings opportunities tied to alternative means of measuring success outside of the traditional return on rate base. New abilities to track network functioning and customer engagement permit rewards for meeting policy goals previously unavailable in a pre-digital, pre-distributed energy environment.

### **Incentive Regulation 2.0: I-X**

The basic I-X price cap model is a UK import, implemented there to speed that country's rapid privatization under the Margaret Thatcher government in the 1980s. US regional Bell operating companies were the first to import I-X regulation after the breakup of AT&T—but only after NERA's involvement in translating the basis for "X" into a solidly grounded economic language more consistent with the US administrative evidentiary standards (the "burden of proof") in dealing with investor-owned enterprises.<sup>3</sup>

Consistent with its more longstanding, due-process-based regulatory institutions designed to produce evidence-based results, the derivation of the X-factor in the United States and Canada moved into a productivity measurement model designed to mimic a competitive constraint. The measurement of total factor productivity (TFP) growth mirrored theoretical advances in the construction of theoretically suitable index numbers coming out of scholarly study (including that of NERA Managing Director Dr. Jeff D. Makhholm at the University of Wisconsin). With such techniques for reliably constructing productivity indexes, the X-factor became a regular part of I-X cases in most of the jurisdictions in Canada and the United States that continue to pursue such a regulatory model. Those jurisdictions included a number of states (e.g., California, Maine, New York, and Massachusetts) and provinces (Ontario, British Columbia, and Alberta).

### **The Origin of Incentive Regulation 1.0: The Prudence Standard Evolving with Targeted Incentives**

US incentive regulation first formed around the practical experiences of future US Supreme Court Justice Louis Brandeis—who more than anyone else was the architect of the US regulatory model. As a prominent private lawyer in Boston in the 19th and early 20th centuries, Brandeis had been deeply involved in dealing with many details of the governance, accounting, and rate conflicts of the public service firms in New England. He took this experience with him to the Supreme Court—espousing the "prudent investment" principle that limited what regulators would accept into the accounts that track the property of regulated enterprises. Once in property accounts—the rate base—such utility assets are reasonably safe from regulatory seizure, as the law sets a high evidentiary bar for imprudence disallowances. The prudence standard, combined with the legal, accounting, and administrative environment that developed with it, constitute a fundamental incentive in US and Canadian regulatory models.

The basic Brandeis-inspired Regulation 1.0 permitted various innovations, particularly after the 1970s and 1980s when electricity rates rose sharply in real terms. For example, New York and Wisconsin implemented marginal-cost pricing for their respective public utilities in the 1970s. Many US utilities also implemented targeted incentive programs at that time (a 1986 NERA electric utility conference listed 22 targeted and formal incentive regulatory programs in 14 states—with programs under consideration in six more). At that time, US incentive regulation for utilities meant innovative, performance-based programs tied in with the basic US regulatory model driven by the change in the industry starting in the 1970s.

## NERA's Role in Incentive Regulation

As the oldest and largest firm of consulting economists (whose founders began their work in the United States in the 1950s and in the United Kingdom in 1984), NERA has been directly involved with all aspects of incentive regulation as it has shaped energy utilities and regulatory initiatives around the world. NERA's economists have been involved in the pursuit and development of incentive regulation in the following areas:

- NERA's Alfred E. Kahn provided the first scholarly treatment of incentive regulation in his book *The Economics of Regulation* in 1970–71 and pioneered the application of marginal-cost pricing.
- We provided the first regular taxonomy of US incentive regulatory regimes in the 1980s as part of a wider analysis of changes in electric utilities coming after the tumultuous 1970s (NERA's John Landon and Richard Schmalensee, 1986).
- We developed the methods to derive objective index numbers for developing reliable indexes for the growth in electricity industry TFP (NERA's Jeff Makhholm, 1986).
- We translated the UK's X-factor into the language of US regulation in the 1990s in applying I-X regulation to the telecommunications industry—defining TFP index number methods as the metric for setting the X-factor (NERA's Tim Tardiff and William Taylor, 1993).
- We provided independent analysis, on behalf of the Alberta Utilities Commission (the AUC), in the largest-ever generic examination of the I-X method in North America (Makhholm, 2010).
- We continue to consult for energy companies in the application of incentive regulation in the context of modern, unbundled energy industries in North America, Europe, and around the world.

NERA's participation in these noteworthy advances in the application of incentive regulation reflects our broad roles in regulatory economics in many sectors, all grounded in the scholarly work of our economists in the tradition of our founders (including Professor Kahn) and the deep work of our economists in energy sectors around the world since.

## Notes

<sup>1</sup> See MIT's "Utility of the Future" report, available at <http://energy.mit.edu/wp-content/uploads/2016/12/Utility-of-the-Future-Full-Report.pdf>. NERA's Max Luke was part of the research team for the MIT study.

<sup>2</sup> Utility Dive, "2018 State of the Electric Utility Survey," available for download at <https://www.utilitydive.com/library/2018-state-of-the-electric-utility-survey-report/>.

<sup>3</sup> See Tariff and Taylor in the bibliography.

## NERA Incentive Regulation Publications

- A. E. Kahn, *The Economics of Regulation: Volume 1 – Economic Principles*. New York, NY: John Wiley, 1970.
- T. Tardiff and W. Taylor, “Telephone Company Performance Under Alternative Forms of Regulation in the US,” National Economic Research Associates, 1993.
- J. D. Landon, “The Potential of Incentive Regulation,” NERA Electric Utility Conference: Surviving An Era Of Changing Regulation, Scottsdale, Arizona, 12–15 February 1986.
- J. D. Makhholm, *Sources of Total Factor Productivity in the Electric Utility Industry*, PhD Dissertation, Department of Economics, University of Wisconsin-Madison, 1986.
- R. L. Schmalensee, “The Potential of Incentive Regulation,” NERA Electric Utility Conference: Surviving an Era of Changing Regulation, Scottsdale, Arizona, 12–15 February 1986.
- J. D. Makhholm, “X Marks the Spot: How to Calculate Price Caps for the Distribution Function,” *Public Utilities Fortnightly*, Vol. 135, No. 22, December 1997, p. 52.
- J. D. Makhholm, “Incentive Regulation Meets Electricity Transmission on a Grand Scale: FERC Order No. 2000 and PBR,” *The Electricity Journal*, Vol. 13, No. 2, May 2000, pp. 57–64.
- J. D. Makhholm, “Elusive Efficiency and the X-Factor in Incentive Regulation: The Törnqvist v. DEA/Malmquist Dispute,” in S. P. Voll and M. K. King (Eds.), *The Line in the Sand: The Shifting Boundaries Between Markets and Regulation in Network Industries*, National Economic Research Associates, White Plains, New York, 2007, pp. 95–115.
- J. D. Makhholm, “‘Decoupling’ for Energy Distributors: Changing 19th Century Tariff Structures to Address 21st Century Energy Markets,” *Energy Law Journal*, Vol. 29, No. 1, 2008, pp.157–172.
- J. D. Makhholm, A. J. Ros, and S. C. W. Collins, “North American Performance-Based Regulation for the 21st Century,” *The Electricity Journal*, Vol. 25, Issue 4, May 2012, pp. 33–47.
- J. Grayburn and R. Druce, “Reflections on the Successes of RIIO and the Scope for Future Improvement,” *Energy Regulation Insights*, Issue 42, January 2016.
- J. D. Makhholm, “The REvolution yields to a more familiar path: New York’s Reforming the Energy Vision (REV),” *The Electricity Journal*, Vol. 29, Issue 9, November 2016, pp. 48–55.
- J. D. Makhholm, “Regulating Utility Efficiency, ‘Fast and Slow’; The Current Australian Problem,” *Natural Gas and Electricity*, October 2017, pp. 28–32.

## About NERA's Energy Practice

NERA's Energy Practice is at the forefront of the continuing transformation of the energy industries worldwide. We have pioneered in developing approaches for introducing competition in segments such as power generation and gas supply where competition is workable and for improving the regulation of sectors where it is not. We work with companies, governmental bodies, and regulators worldwide to design competitive gas and electricity markets and to develop tariffs and rules of access for regulated transmission and distribution systems for electricity, gas, and the transport of oil and oil products.

With industry restructuring in many countries, we also help companies develop strategies for exploring new opportunities and minimizing new risks, including issues related to climate change and other environmental initiatives. We help our clients to develop new regulatory strategies and, when needed, support our clients with analysis and testimony before regulatory commissions, antitrust and competition policy agencies, and domestic and international courts.

Our economists help clients to decide which lines of business to pursue; to divest assets no longer consistent with their strategy; to identify and evaluate opportunities for mergers, acquisitions, and investment; and to develop bidding, trading, contracting, and marketing organizations and strategies. Our work also includes designing and conducting energy auctions, as well as providing strategy and valuation advice on mergers and acquisitions, the financing of energy companies, and the financial restructuring of distressed companies.

## About NERA

NERA Economic Consulting ([www.nera.com](http://www.nera.com)) is a global firm of experts dedicated to applying economic, finance, and quantitative principles to complex business and legal challenges. For over half a century, NERA's economists have been creating strategies, studies, reports, expert testimony, and policy recommendations for government authorities and the world's leading law firms and corporations. We bring academic rigor, objectivity, and real world industry experience to bear on issues arising from competition, regulation, public policy, strategy, finance, and litigation.

NERA's clients value our ability to apply and communicate state-of-the-art approaches clearly and convincingly, our commitment to deliver unbiased findings, and our reputation for quality and independence. Our clients rely on the integrity and skills of our unparalleled team of economists and other experts backed by the resources and reliability of one of the world's largest economic consultancies. With its main office in New York City, NERA serves clients from more than 25 offices across North America, Europe, and Asia Pacific.

## Contacts

For further information and questions, please contact the authors:

**Dr. Jeff D. Makholm**

Managing Director  
Boston: +1 617 927 4540  
[jeff.makholm@nera.com](mailto:jeff.makholm@nera.com)

**Dr. Laura T.W. Olive**

Senior Consultant  
Boston: +1 617 927 4588  
[laura.olive@nera.com](mailto:laura.olive@nera.com)

**Max N. Luke**

Consultant  
Boston: +1 617 927 4506  
[max.luke@nera.com](mailto:max.luke@nera.com)



To receive publications, news, and insights from NERA, please visit [www.nera.com/subscribe](http://www.nera.com/subscribe).