



Energy Technologies Area

Lawrence Berkeley National Laboratory

Future Electric Utility Regulation Series Report #8:

***Regulatory Incentives and Disincentives  
for Utility Investments in Grid Modernization***

**May 31, 2017**

**Steve Kihm – Seventhwave**

**Janice Beecher – Institute of Public Utilities,  
Michigan State University**

**Ronald Lehr – attorney and consultant**

**Lisa Schwartz, Berkeley Lab, Project Manager**

- About the series
- Webinar housekeeping items
- Three perspectives on regulatory incentives and disincentives for utility investments in grid modernization (15 min. each)
  - Financial analyst – Steve Kihm
  - Institutional framework – Janice Beecher
  - Public policy – Ronald Lehr
- Q&A (25 min.)

# Future Electric Utility Regulation Series (1)

- A series of reports from Berkeley Lab taps leading thinkers to grapple with complex regulatory issues for electricity
- Unique multi-perspective approach highlights different views on the future of electric utility regulation and business models and achieving a reliable, affordable, and flexible power system to inform ongoing discussion and debate
- Expert advisory group provides guidance and review
- Primary funder of initial six reports: U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability - Electricity Policy Technical Assistance Program
- Office of Energy Efficiency and Renewable Energy's Solar Energy Technologies Office is co-funding new reports under DOE's Grid Modernization Initiative



[feur.lbl.gov](http://feur.lbl.gov)

# Future Electric Utility Regulation Series (2)

1. *Distributed Energy Resources (DERs), Industry Structure and Regulatory Responses*
  2. *Distribution Systems in a High DER Future: Planning, Market Design, Operation and Oversight*
  3. *Performance-Based Regulation in a High DER Future*
  4. *Distribution System Pricing With DERs*
  5. *Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives*
  6. *The Future of Electricity Resource Planning*
  7. *The Future of Centrally-Organized Wholesale Electricity Markets*
  8. *Regulatory Incentives and Disincentives for Utility Investments in Grid Modernization –  
**Today's topic***
  9. *Value-Added Electricity Services: New Roles for Utilities and Third-Party Providers (underway)*
- Additional reports forthcoming: [feur.lbl.gov](http://feur.lbl.gov)
  - Expert advisory group (next slide) provides guidance and review



- Commissioner Lorraine Akiba, Hawaii Public Utilities Commission
- Janice Beecher, Institute of Public Utilities, Michigan State University
- Doug Benevento, Xcel Energy
- Ashley Brown, Harvard Electricity Policy Group
- Paula Carmody, Maryland Office of People's Counsel
- Ralph Cavanagh, Natural Resources Defense Council
- Steve Corneli, consultant
- Tim Duff, Duke Energy
- Peter Fox-Penner, Boston University Questrom School of Business
- Scott Hempling, attorney
- Val Jensen, Commonwealth Edison
- Commissioner Travis Kavulla, Montana Public Service Commission
- Steve Kihm, Seventhwave
- Chair Nancy Lange, Minnesota Public Utilities Commission
- Lori Lybolt, Consolidated Edison
- Sergej Mahnovski, Edison International
- Kris Mayes, Arizona State University College of Law/Utility of the Future Center
- Jay Morrison, National Rural Electric Cooperative Association
- Delia Patterson, American Public Power Association
- Commissioner Carla Peterman, California Public Utilities Commission
- Sonny Popowsky, Former consumer advocate of Pennsylvania
- Karl Rábago, Pace Energy & Climate Center, Pace University School of Law
- Rich Sedano, Regulatory Assistance Project
- Peter Zschokke, National Grid

# Webinar Housekeeping Items

- We're recording the webinar and will post it on our web site.
- Because of the large number of participants, everyone is in *listen* mode only.
- **Please use the chat box to send us your questions** and comments any time during the webinar. You may want to **direct your question to a specific author.**
- The report authors will each have 15 minutes to present.
- Moderated Q&A will follow, with the report authors responding to questions typed in the chat box.
- The report and webinar slides are posted at **[feur.lbl.gov](http://feur.lbl.gov)**

# About the Authors (in order of presentation)



**Steve Kihm** is principal and chief economist at Seventhwave, a think tank in Madison, Wisconsin, and senior fellow at Michigan State University's (MSU's) Institute of Public Utilities. He has worked in the field of utility regulation for 36 years, including 21 years at the Wisconsin Public Service Commission. He has appeared as an expert witness in utility proceedings across the country, published reports and journal articles, and is co-author with Janice Beecher of the book, *Risk Principles for Public Utility Regulators* (MSU Press). Kihm holds a bachelor's degree in economics and master's degrees in financial economics and quantitative methods from the University of Wisconsin. He is a Chartered Financial Analyst.

**Janice Beecher** has served as Director of the Institute of Public Utilities at MSU since 2002, bringing more than 30 years of applied research experience to the position. Her areas of interest include regulatory institutions, governance, and pricing, and she specializes in the water sector. She is a frequent author, lecturer, and participant in professional forums and Editor of Utilities Policy. She previously held positions at Ohio State and Indiana Universities and the Illinois Commerce Commission. Beecher has a Ph.D. in political science from Northwestern University and faculty appointments in MSU's College of Social Science, where she has taught graduate courses in public policy and regulation.

**Ronald L. Lehr** practices law and consults for clients on energy regulation and business matters on a variety of topics related to increasing the amount of clean energy in electric systems, including system, operations, integration and transmission planning for the Western Interconnection and new utility business models and regulatory reforms that support them. He served for seven years (1984 to 1991) as Chairman and Commissioner of the Colorado Public Utilities Commission. He has served on corporate and foundation boards of directors and boards of advisors, including as President of the Denver Board of Water Commissioners.

**Please use the chat box** to send us your questions and comments any time during the webinar. You may want to **direct your question to a specific author**. We'll address as many questions as we can following the presentation.


The report and webinar slides are posted at [feur.lbl.gov](http://feur.lbl.gov)



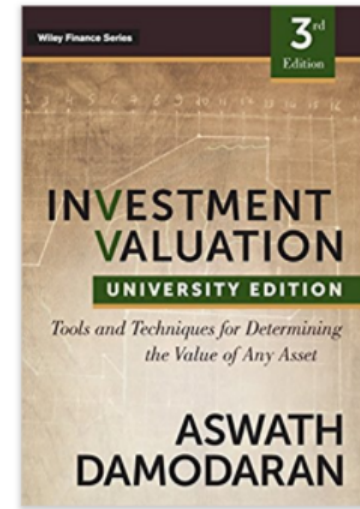
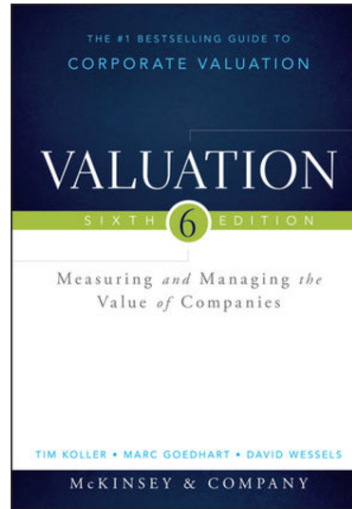
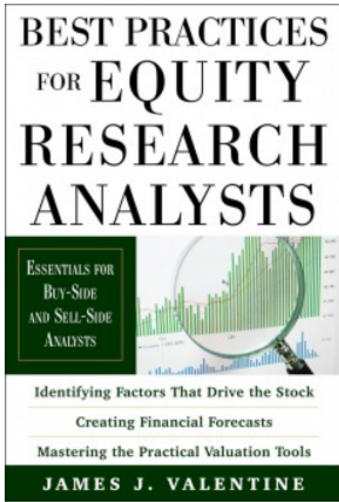
# Incentives and Disincentives for Utility Grid Modernization: Financial Analyst Perspective

**Steve Kihm, CFA**  
**Principal and Chief Economist**  
**Seventhwave**

**May 31, 2017**

- Can utilities raise capital for grid modernization? **Yes**
- Do utility managers see value for shareholders in grid modernization projects? **Maybe**  **This is the relevant question.**
- Shareholder value (stock price)
  - **risk, return and scale**

# Proper framing of the problem



CREDIT SUISSE

GLOBAL FINANCIAL STRATEGIES  
www.credit-suisse.com

## Capital Allocation

Evidence, Analytical Methods, and Assessment Guidance

October 19, 2016

Authors

Michael J. Mauboussin  
[michael.mauboussin@credit-suisse.com](mailto:michael.mauboussin@credit-suisse.com)

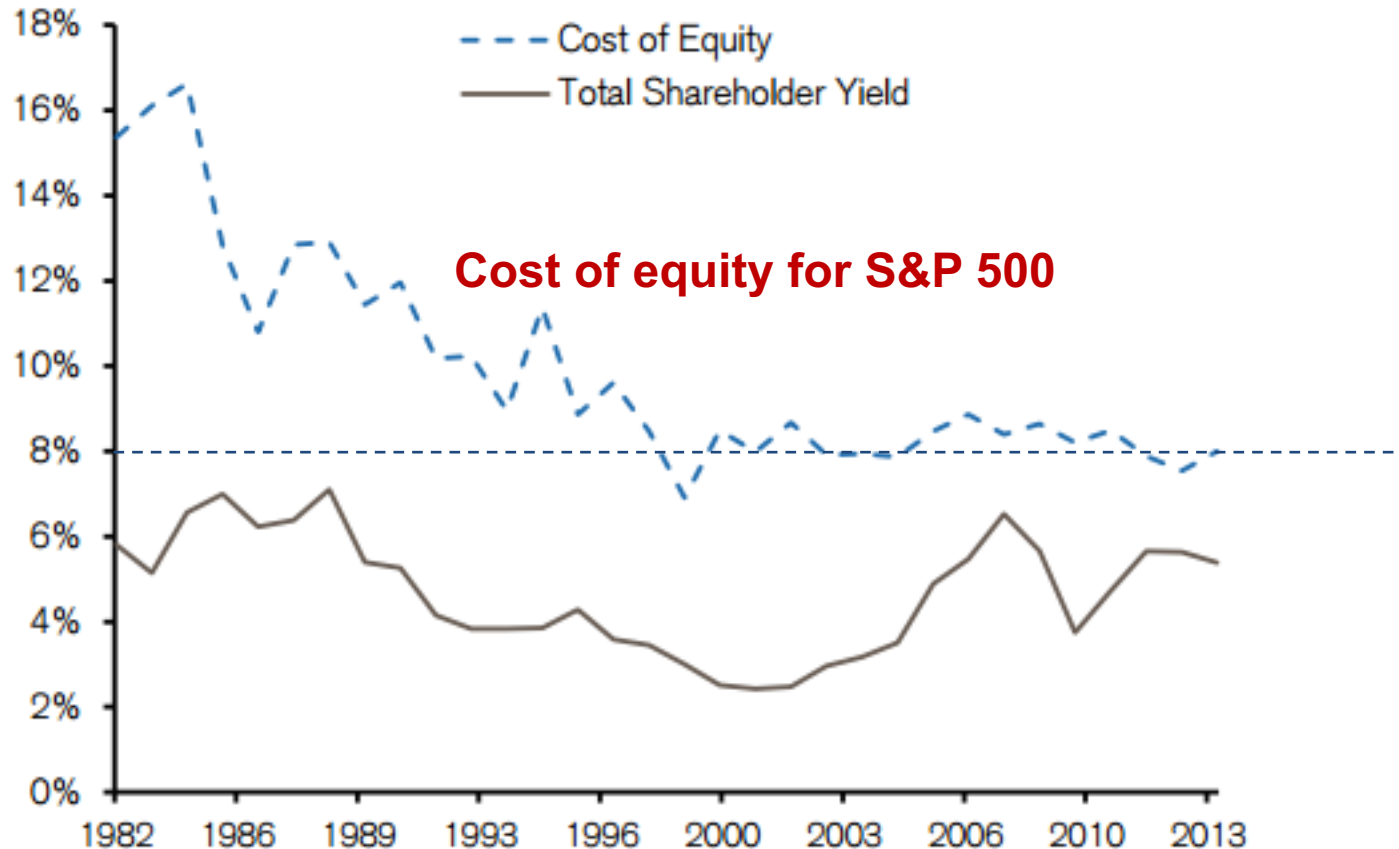
Dan Callahan, CFA  
[daniel.callahan@credit-suisse.com](mailto:daniel.callahan@credit-suisse.com)

Darius Majd  
[darius.majd@credit-suisse.com](mailto:darius.majd@credit-suisse.com)



# Credit Suisse *Distributing Cash to Shareholders*

**Exhibit 10: Total Shareholder Yield for the S&P 500 versus the Cost of Equity (1982-2013)**



Source: Aswath Damodaran; S&P Dow Jones Indices, Liang and Sharpe, Credit Suisse estimates.





## Xcel Energy

**Beyond 2019, we assume a system wide normalized 10% average allowed ROE** and 0.5% average annual long-term usage growth. We assume **a 7.5% cost of equity** in our discounted cash flow valuation. This is lower than the 9% rate of return we expect investors will demand of a diversified equity portfolio. A 2.25% long-term inflation outlook underpins our capital cost assumptions. Our cost of capital assumption is 5.9%.

**Capital allocation is a senior management team's most fundamental responsibility...** The objective of capital allocation is to build long-term value per share.

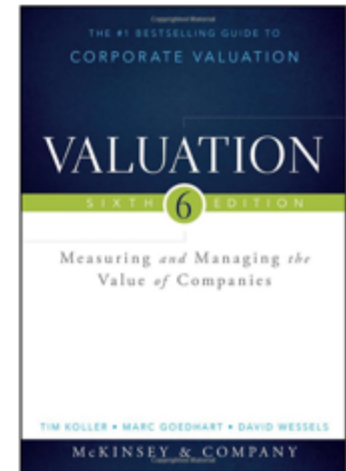
Mauboussin, M., et al. 2016. *Capital Allocation: Evidence, Analytical Methods, and Assessment Guidance*. Credit Suisse.

As EEl explains, “these projects also carry the most upfront development time, longer construction schedules, and overall risk.” However, without a sufficient ROE, **electric utilities are likely to choose** short-term, more local projects, instead of riskier, more strategic options. (Emphasis added.)

Kuzika, L. S. 2013, June 17. EEl Urges FERC to Reform its ROE Methodology. *Energy & Environmental Law Adviser*.

Shareholder value is created when a firm invests in a project that earns a return ( $r$ ) that exceeds the cost of the capital used to finance it ( $k$ ).

$$r > k$$

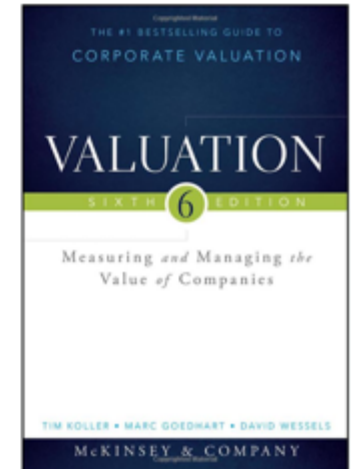




If  $r$  exceeds  $k$ , the more capital we invest ( $I$ ) the more value we create.

$$V = (r - k) \times I$$

(value engine)



risk, return, and scale

If  $r$  exceeds  $k$ , the more capital we invest ( $I$ ) the more value we create.

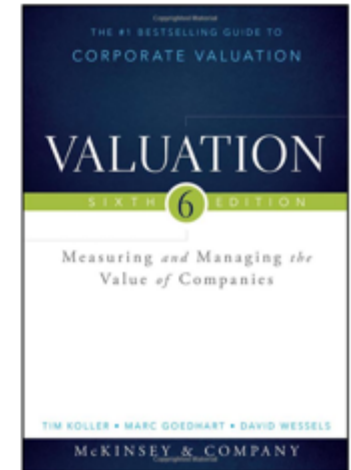
How does the policy affect the utility's systematic risk?

$$V = (r - k) \times I$$

(value engine)

How does the policy affect the expected return on equity?

risk, return, and scale

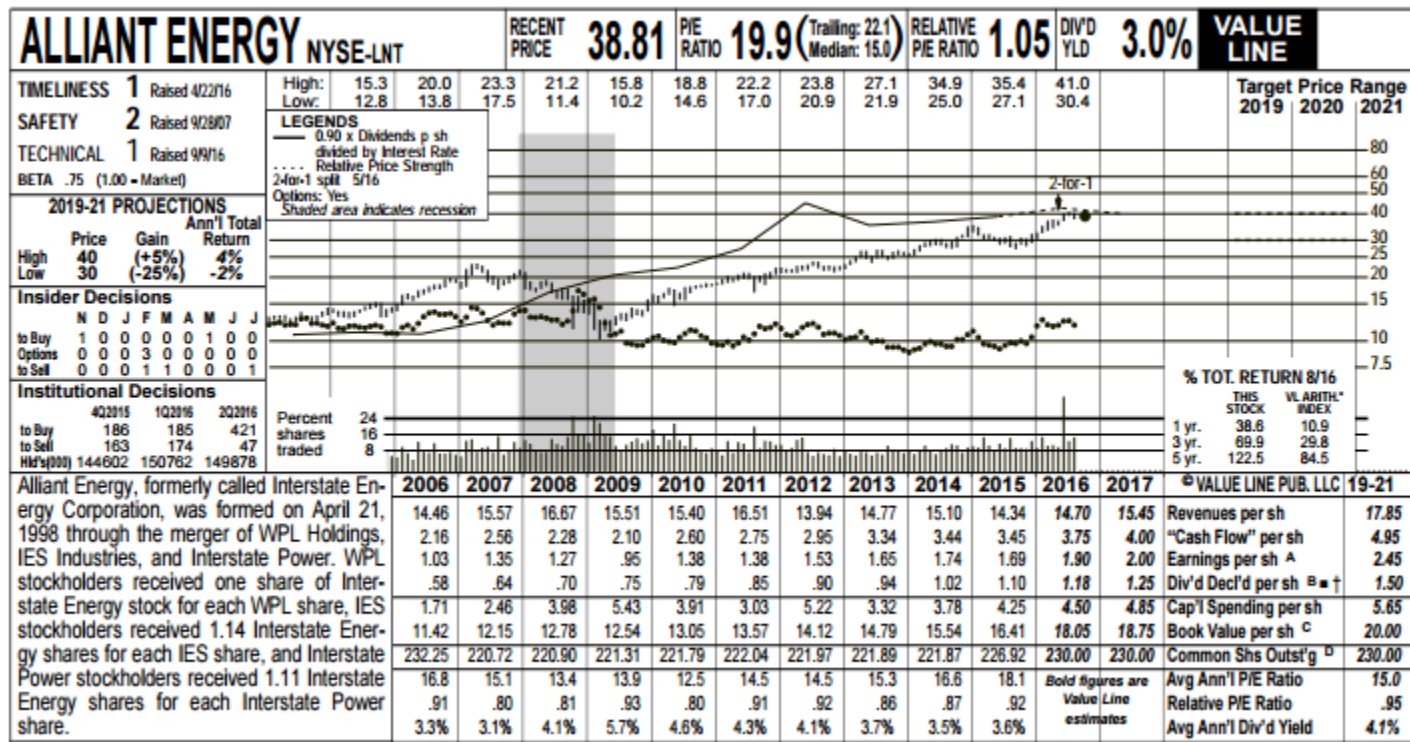


What are the scale differences between the utility's resource options?

To get the full price impact you would use such a model

$$P = \frac{N BVPS r (1 - b) + (r - k) I}{N (k - b r)}$$

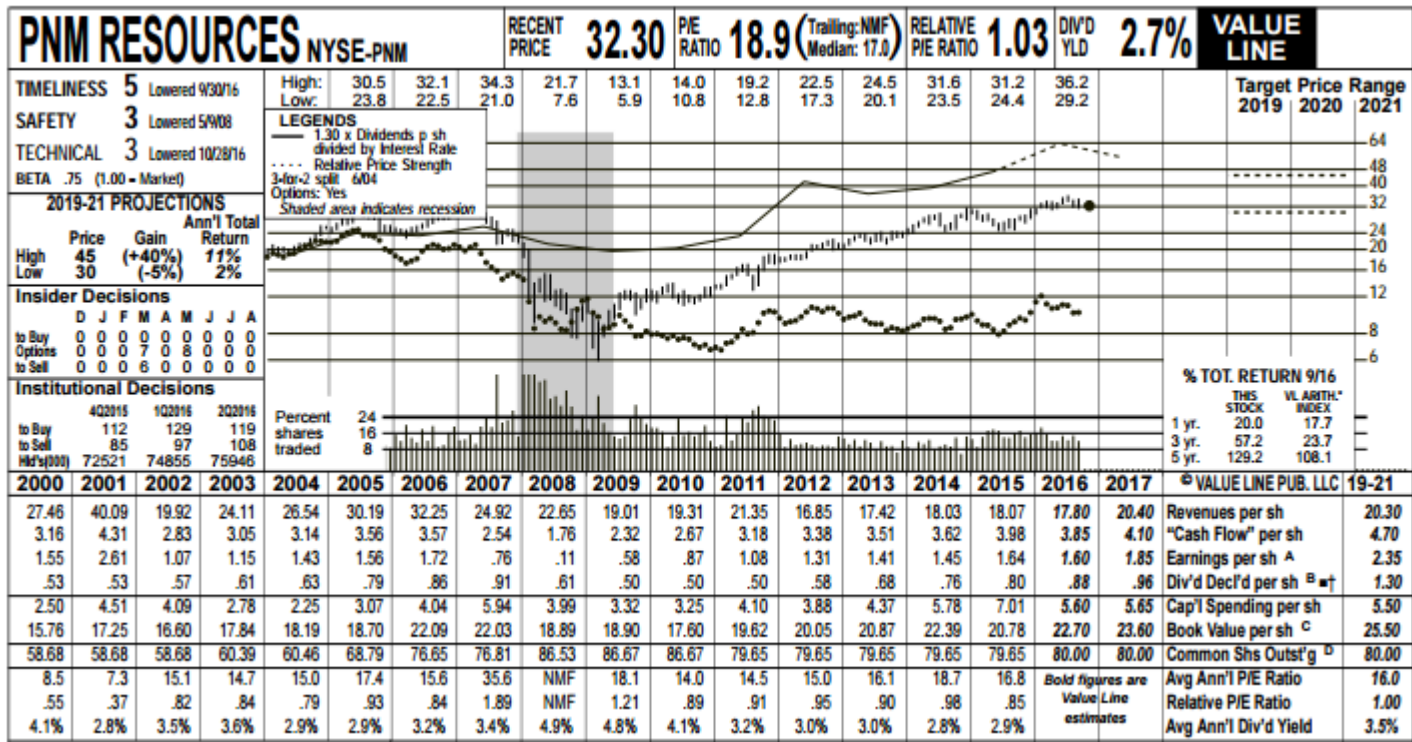
# The Value Line Investment Survey



2016	2017	2019-21
5.5%	6.0%	Return on Total Cap'l
10.5%	10.5%	Return on Shr. Equity
11.0%	11.0%	Return on Com Equity <sup>E</sup>
		7.0%
		12.0%
		12.5%



# The Value Line Investment Survey



2016 2017

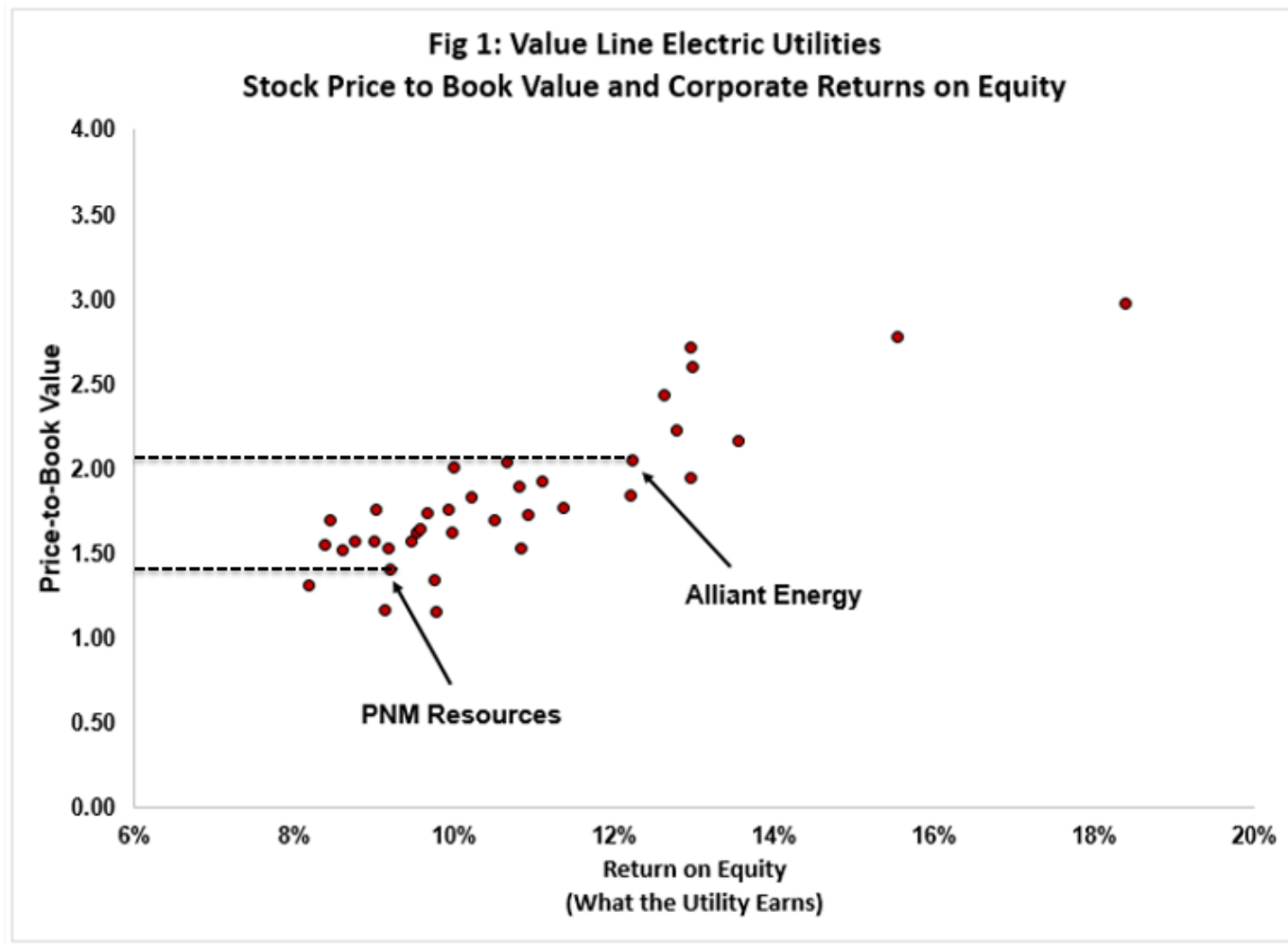
2019-21

<b>5.0%</b>	<b>5.5%</b>	<b>Return on Total Cap'l</b>	<b>6.0%</b>
<b>7.5%</b>	<b>8.0%</b>	<b>Return on Shr. Equity</b>	<b>9.5%</b>
<b>7.5%</b>	<b>8.0%</b>	<b>Return on Com Equity <sup>E</sup></b>	<b>9.5%</b>

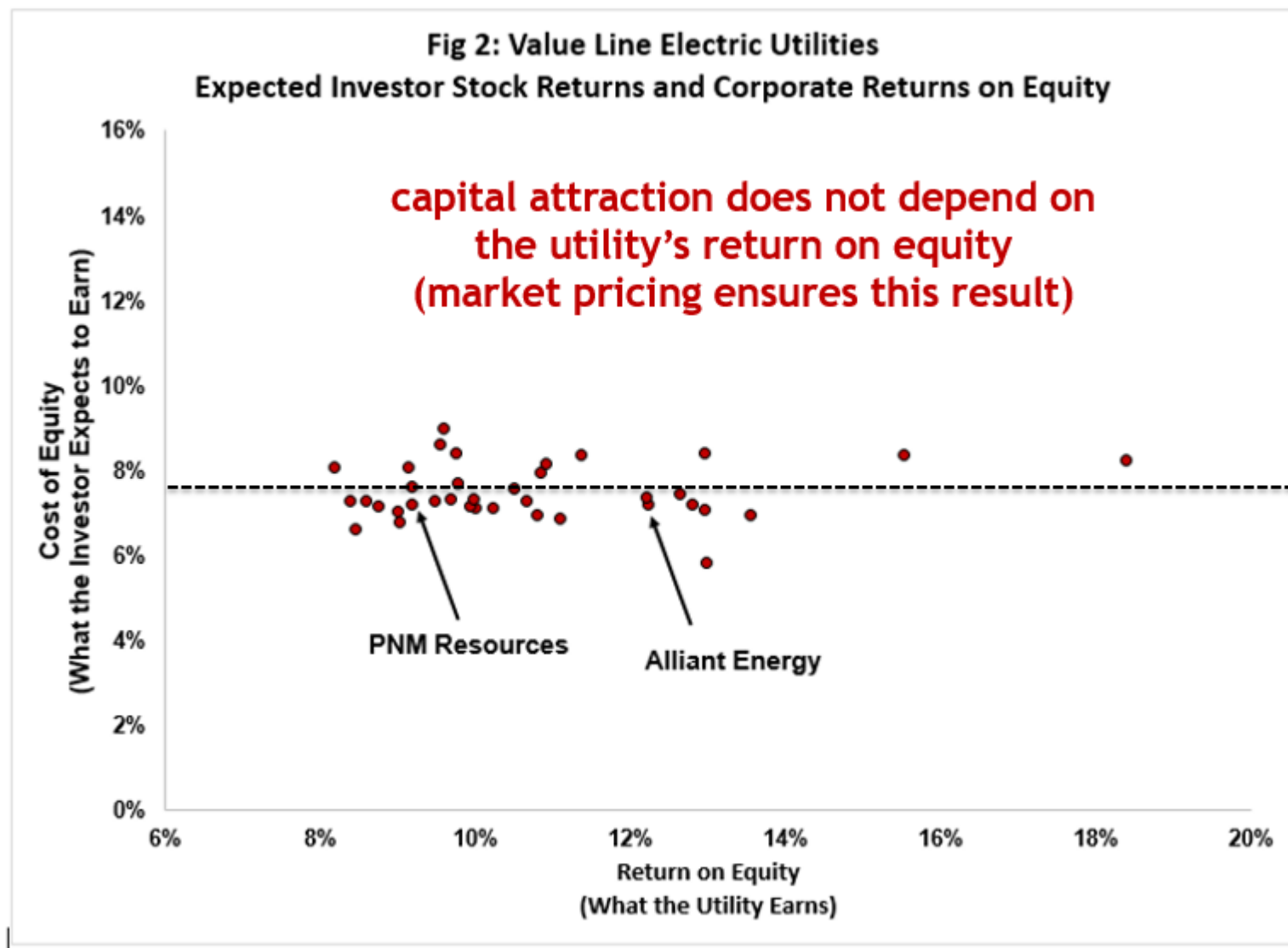


# High returns on equity don't attract more capital

The market uses pricing so that capital flows easily to all utilities regardless of the return on equity the utility earns



# New investors expect to earn about the same return on all utility stocks



**For every dollar invested  
Alliant creates more value  
for present shareholders**

$$\text{Alliant: } V = \underline{(0.125 - 0.075)} \times I$$

$$\text{PNM: } V = \underline{(0.095 - 0.075)} \times I$$



$$\text{Alliant: } V = (0.125 - 0.075) \times I$$

$$\text{PNM: } V = (0.095 - 0.075) \times I$$

**Stocks are priced so that those providing new capital to either company expect to earn about the same return.**

**Here the project with the larger scale will create more value per-share for investors.**



**Substations:  $V = (0.100 - 0.070)\$500,000,000 = \$15,000,000$**

**Two Way Flows:  $V = (0.100 - 0.070)\$400,000,000 = \$12,000,000$**

**Can we provide an incentive to invest in the two-way flow project?**

**Yes, if we set the  
return high enough.**

**Substations:  $V = (0.100 - 0.070)\$500,000,000 = \$15,000,000$**

**Two Way Flows:  $V = (0.120 - 0.070)\$400,000,000 = \$20,000,000$**



**Now the project with the higher return  
will create more value per-share for investors.**

**But not any higher return will do the trick.**



**Substations:  $V = (0.100 - 0.070)\$500,000,000 = \$15,000,000$**

**Two Way Flows:  $V = (10.5\% - 0.070)\$400,000,000 = \$14,000,000$**

**Now the project with the lower return  
will create more value per-share for investors  
(scale again dominates).**


**New shareholders  
provide all of this  
capital**

**Present shareholders  
capture the value  
gain as a windfall**

Substations:  $V = (0.100 - 0.070)\$500,000,000 = \$15,000,000$

Two Way Flows:  $V = (10.5\% - 0.070)\$400,000,000 = \$14,000,000$

**New shareholders  
earn the cost of equity based on  
what they paid for the stock**

Note that an opportunity to invest in a project offering more than the cost of capital generates an immediate capital gain for investors. This is a **windfall gain**, since it is realized *ex ante*. 

Myers, S. 1972. The Application of Finance Theory to Public Utility Rate Cases. *The Bell Journal of Economics and Management Science*.

$$V = (r - k) \times I$$

(value engine)

It's all about the details.  
There are no general answers.

# Do these regulatory policies create an incentive to modernize the grid?

- Different rates of return and costs of capital for different utility assets (**it depends on  $r$ ,  $k$ , and  $I$** )
- De-risking certain resource types (**it depends on  $r$ ,  $k$ , and  $I$** )
- Providing rate base treatment for certain expense items (**it depends on  $r$ ,  $k$ , and  $I$** )
- Formula rates (**it depends on  $r$ ,  $k$ , and  $I$** )
- Price caps (**it depends on  $r$ ,  $k$ , and  $I$** )
- Earnings sharing mechanisms (**it depends on  $r$ ,  $k$ , and  $I$** )





Steve Kihm  
Principal and Chief Economist

[skihm@Seventhwave.org](mailto:skihm@Seventhwave.org)

608-210-7131

**Please use the chat box** to send us your questions and comments any time during the webinar. You may want to **direct your question to a specific author**. We'll address as many questions as we can following the presentation.

The report and webinar slides are posted at [feur.lbl.gov](http://feur.lbl.gov)

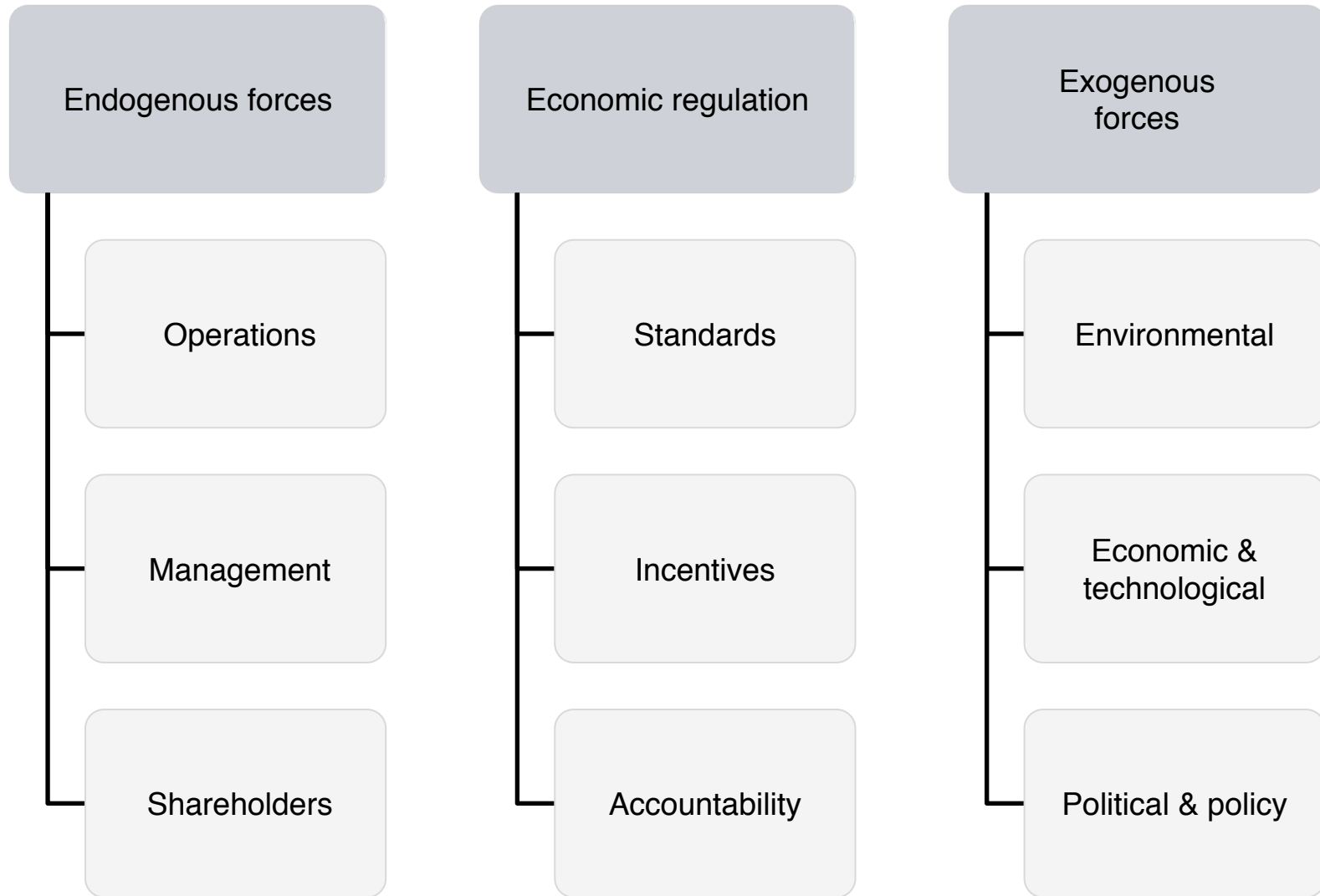
# **Institutional Perspective**

## **The Role of Incentives in Public Utility Regulation**

**Janice A. Beecher, Ph.D., Director  
Institute of Public Utilities  
Michigan State University  
May 31, 2017**

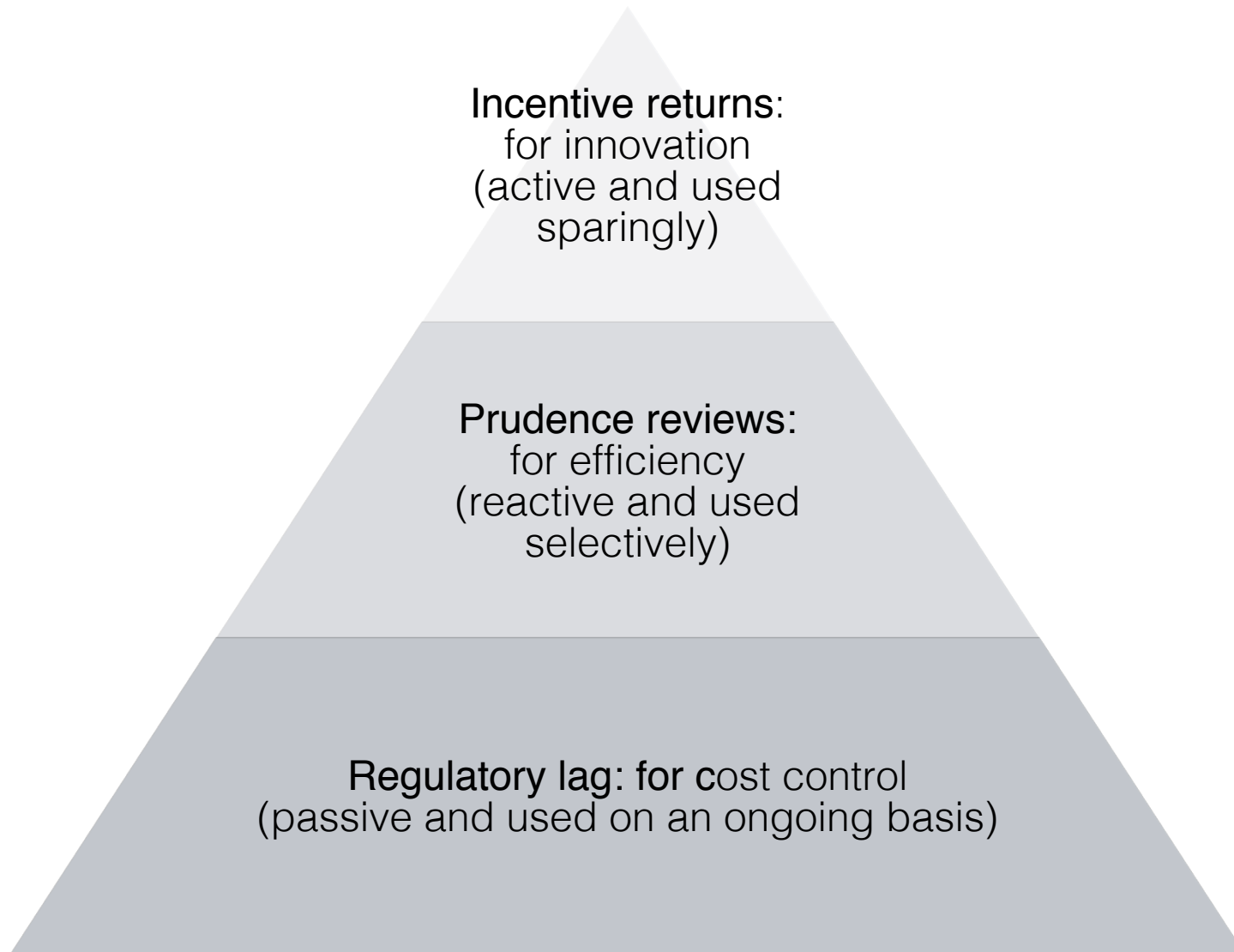
- In the context of grid modernization, there is a strong impulse today to provide utilities with positive incentives under a “new paradigm”
- All regulation is incentive regulation – the dichotomy between “traditional” and “incentive” regulation is (mostly) false
- The traditional economic regulatory framework can accommodate new utility business models and pricing
- The use of incentives raises issues of wealth transfer and activism that take economic regulation beyond its remit
- What may be needed today is not a new paradigm but a new prudence – and prudence earns fair but not extraordinary returns
- This is not a defense of the status quo for either infrastructure or regulation

# Factors affecting utility performance



- Guiding paradigm for regulation centers on the construct of a social compact
  - How the compact is viewed is a matter of perspective
  - The view taken here is from the perspective of the empowered state
  - Independence of the regulator as an arm of the state is presumed
- Compact is a living and evolving charter between the institutional state and the regulated public utility
- Under the compact, regulation provides a conditional proxy for competition
  - Regulation imposes discipline to promote economic efficiency and “economic equity”
  - Regulators also consider “legal equity” (just and reasonable standard)
  - Other institutions are largely responsible for “social equity,” including environmental and distributive justice
- Compact does not guarantee investment opportunities or returns, shield them from loss, or ensure their survival in perpetuity

# Three risk-based incentive tools used by regulators



# Incentives under traditional regulation

		Investment	Performance		
			Cost control	Efficiency	Innovation
Return on investment	Premium embedded in the fair return to promote infrastructure investment	✓			
Financial accounting and reporting	Transparency in capital and operating expenditures and performance		✓		
Cost recovery	Disallowance of imprudent capital or operating expenditures		✓		
Regulatory lag	Time period between cost incurrence and an authorized rate adjustment		✓		
Prudence reviews	Sound managerial decisions based on knowable information			✓	
Financial audits	Detailed review of general or project-specific financial indicators			✓	
Management audits	Detailed review of general or project-specific management practices			✓	✓
Price freezes or caps	Extension of regulatory lag to a multiyear rate period			✓	✓
Certificate of public convenience	Review of planned capital expenditure to ensure its necessity			✓	✓
Integrated resource planning	Balanced consideration of supply-side and demand-side management options			✓	✓
Performance standards	Specified terms of service to ensure acceptable performance			✓	✓
Incentive returns	Bonus above fair return tied to performance to promote innovation				✓



# Regulatory lag: potential trends between rate cases

- Much effort is devoted to reducing regulatory lag – but not all lag is regulatory
- Utilities may lag in strategic management
  - Forecasting costs and sales revenues
  - Accounting for price elasticities and other factors in rate proposals
  - Making timely, complete, and convincing regulatory filings

		Efficiency trend between rate adjustments	
		Increasing operational efficiency	Decreasing operational efficiency
Cost and sales trends between rate adjustments	Falling costs and/or rising sales	Achieving returns is likely	Achieving returns is possible
	Rising costs and/or falling sales	Achieving returns is possible	Achieving returns is unlikely

# Incentives under traditional regulation: parsing regulatory fact and fiction

- Incentives that favor capital expenditures
  - The spending propensity
- Incentives that favor ratebase treatment
  - The technology neutrality issue
- Incentives that favor selling output
  - The throughput motive
- Incentives that favor high fixed charges
  - The rate-design dilemma
- Incentives that favor centralized technologies
  - The prosumer problem
- Incentives that favor the status quo
  - The innovation challenge

- Incentives can also be understood as subsidies that transfer wealth
  - Long-standing critique of economic regulation
- Subsidies supported by utility rates are a regressive form of taxation
  - Low-income households are disproportionately affected
- Direction of subsidization matters
  - Subsidies for incentives intended to change the behavior of utilities, their investors, or their ratepayers are distinct from those to advance the goals of universal service



**THE WALL STREET JOURNAL.** Janice Beecher Join now 50% off

Home World U.S. Politics Economy Business Tech Markets **Opinion** Arts Life Real Estate Q

REVIEW & OUTLOOK A GOP Health-Care Reprieve? What's Bill Smoking? Japan's Potato Panic

OPINION | COMMENTARY

## Thanks for Giving Me Your Tax Money

I'm opposed to all energy subsidies—unless, of course, I'm the one collecting them.

*By Robert Bryce*  
April 18, 2017 6:34 p.m. ET

Now that tax day has passed, I must thank you, my fellow federal taxpayers. You all are the wind beneath my solar panels.

Pardon me for mixing energy metaphors, but it's only appropriate that I express appreciation for the generous subsidy you provided for the 28-panel, four-array, 8,540-watt photovoltaic system I installed on my metal roof last year. Thanks to the investment tax credit, I slashed my 2016 federal tax bill by \$7,758...

Recommended Videos

1. Airlines Boosting First Class, Skimping on Coach
2. Opinion Journal: How Government Twists Climate Statistics

- Economic regulation is one of many policy domains affecting utilities
- Regulators are increasingly asked to act beyond their remit
  - In particular, there is some pressure to merge economic and environmental roles
- Rationale for regulatory activism in the contemporary context often centers on:
  - The potentially dire consequences of externalities
  - The laxness of other institutions in addressing them
- Taxpayers should bear the costs and risks of policies that benefit society
  - Including positive and negative externalities – socialization of costs
  - Electrification of the fleet and vehicle charging provides a case study
- Regulation can be understood as a constrained optimization problem
  - The job of the economic regulator is to “get us there prudently”
  - Regulators should be active within their policy domain and communicate with others

# A new paradigm or a new prudence?

- New business and pricing models do not constitute a new regulatory paradigm
- Regulators may need a new and obligatory prudence
  - Based on enforceable standards and generally accepted practices
  - Both can be strengthened in light of technological advances and opportunities as well as dynamic supply and demand conditions
- Legal standard for prudence based on “known and knowable” remains core
  - Various regulatory tools can be used to enforce prudence within the paradigm
  - Certificates of need do not ensure prudence or cost recovery
- Prudence today is not just about efficiency but about optimization under dynamic supply and demand conditions, facilitated by new tools
  - Tools for enhancing utility performance
  - Tools for enhancing regulatory enforcement
- Burden of proof remains on the utility
  - If not, why not?
  - Utilities must make the case – not vendors or other stakeholders

# A new prudence: tools for enhancing utility performance

adaptive analysis asset bidding **capital** competitive comprehensive  
construction contingency **control** cyber decision design development  
digital diversification dynamic ecological engagement firm forecasting gis imaging  
infrastructure integrated intelligence load  
**management** mapping market modeling  
**planning** portfolio  
modular operating options outreach pricing resilient resource rs scada security services spatial storage supply-chain systems  
technologies threats

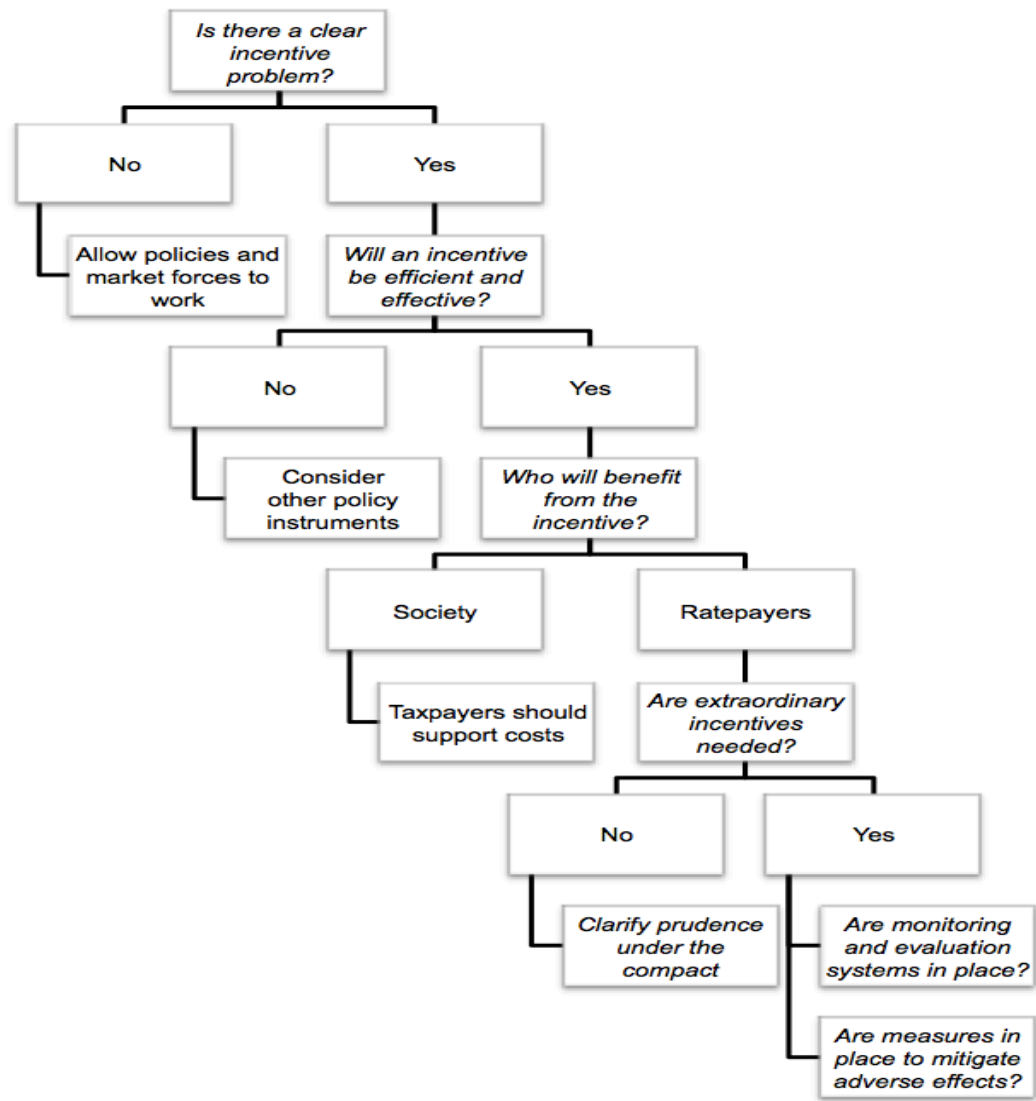
# A new prudence: tools for enhancing regulatory enforcement



- Incentive-oriented regulation should be purposeful, targeted, and consistent with policy mandates and measurable performance criteria
- The use of incentives should be limited in time and scope, with the ultimate goal of letting market forces and prices work as soon as practical
- Incentive mechanisms should be symmetrical, presenting the potential for both upside (rewards) and downside (penalties) consequences
- Incentives should be closely monitored and rigorously evaluated in terms of intended and unintended consequences as well as interactive effects
- Evaluation methods should disentangle the effects of incentives from other endogenous or exogenous factors affecting utility performance
- The regressive impacts of rate-supported incentives should be considered, as well as taxpayer subsidies or corrective rate design, to protect disadvantaged households



# Conceptual framework for considering incentives



- The rush to replace the paradigm may be a function of institutional memory loss
- Regulators have also lost independence and technical capacity (preemption)
- Failure of the paradigm may be less a failure of theory than of implementation
- Utilities have become risk-averse and policymakers have become conflict-averse
- Utilities today might actually face not too much risk, but too little risk
- Real incentive problem might actually be regulation's greatly modified form
- A newly designed system to motivate modernization might look a lot like RBROR
- Grid modernization combined with regulation provides powerful incentives
- Regulatory processes can be improved and new capacities may be needed
- If regulation no longer serves the public interest, its institutional time may be up

*See Appendix at end of this slide deck*

**Please use the chat box** to send us your questions and comments any time during the webinar. You may want to **direct your question to a specific author**. We'll address as many questions as we can following the presentation.

The report and webinar slides are posted at [feur.lbl.gov](http://feur.lbl.gov)

# Public Policy Perspective: Regulatory Incentives to Support Grid Modernization

Ronald L. Lehr

May 31, 2017

# Cost of Service Regulation Unlikely to Capture Grid Modernization Benefits

- Utility financial incentives misaligned with public policies
  - Equity earning incentives for capital investments
    - CAPEX incentives not targeted for grid mod
  - Incentives lacking for expenses that support operating changes, consumer engagement
  - Innovation, R&D + D&D not focused on in COSR
  - Reliance on litigated case processes
    - Lack of consensus, poor communications and relationships

- Financial incentives
  - Efficiency incentives – Could some of these approaches be modified to support grid modernization?
- Financial disincentives
  - Imprudence and disallowances
  - Regulatory risks
- Monopoly incentives
- Monopsony incentives
- Incentives in ratemaking
- Judgment calls in accounting and allocations
  - Joint cost of production problem

- Planning to identify opportunities, manage risks, R&D, D&D
- Provides information for decision makers
- Builds consensus to help manage regulatory risks
- Performance standards
- “Were correct amounts paid for what we got?”
- “What do we want and how do we pay for that?”

- Five elements in administrative due process
  - Notice, hearing, record, fair decision maker, appeal
- Litigated case procedures — quasi judicial
  - Find facts based on expert witness testimony
  - Drives to extremes, information imbalance
- Quasi legislative procedures — notice is key
  - Rulemaking, policies for future application
  - Policy dialogue, information meetings
  - Drive for consensus, build shared benefits



- Public approvals — record evidence
- Private decisions — investment “due diligence”
- Decision makers’ inquiry: questions until ready to vote “yes” or “no”
- What questions do decision makers need to ask about grid modernization?

Ronald L. Lehr  
[rllehr@msn.com](mailto:rllehr@msn.com)  
303-504-0940



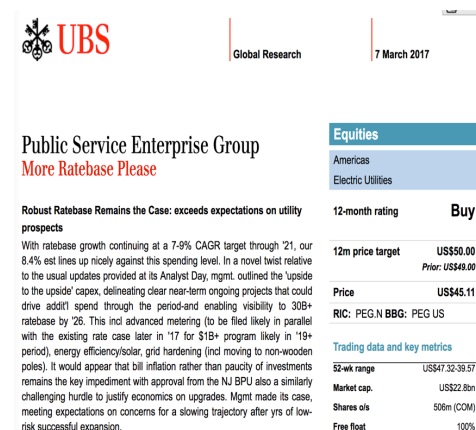
**Please use the chat box** to send us your questions and comments. You may want to **direct your question to a specific author**.

The report and webinar slides are posted at [feur.lbl.gov](http://feur.lbl.gov)

# Appendix for Janice Beecher's presentation

# Incentives that favor capital expenditures – the spending propensity

- Given the strong incentives for capital investment under the RBROR model, the insinuation that it may stand in the way of grid modernization seems a bit disingenuous
- Three spending propensities
  - Capital investment generally
  - Averch-Johnson effect (capex over opex)
  - Temptation to gold plate



UBS Global Research 7 March 2017

**Public Service Enterprise Group**  
More Ratebase Please

**Equities**  
Americas  
Electric Utilities

**12-month rating Buy**

**12m price target US\$50.00**  
Prior: US\$49.00

**Price US\$45.11**

**RIC: PEG.N BBB: PEG US**

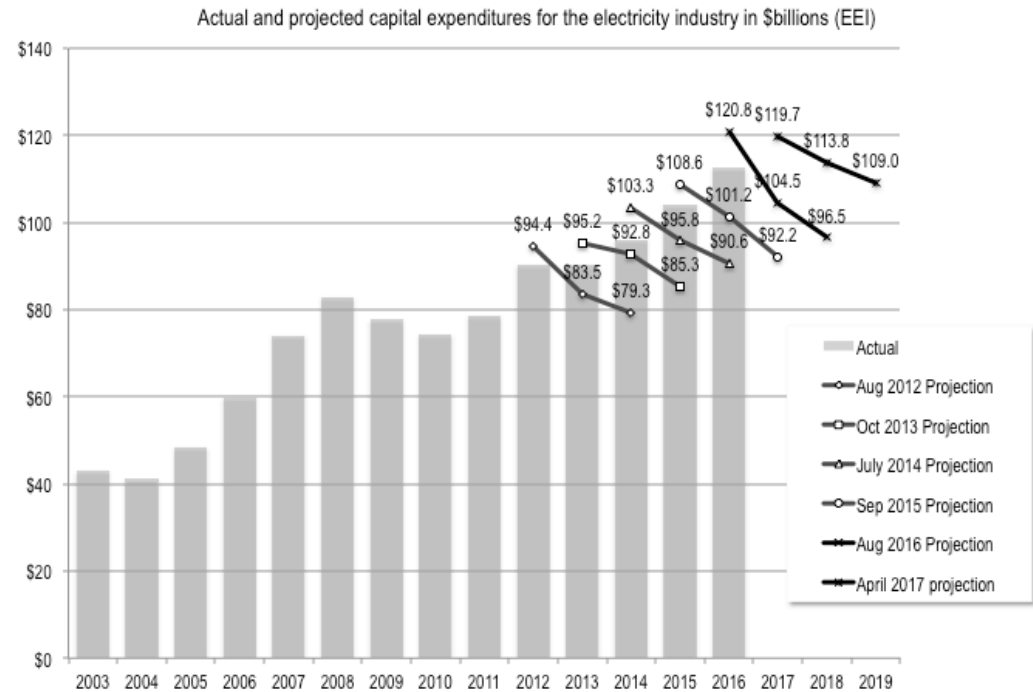
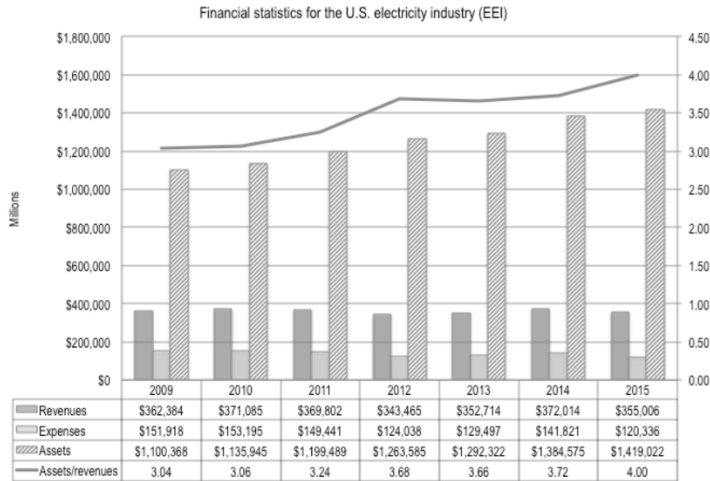
**Trading data and key metrics**

52-wk range	US\$47.32-39.57
Market cap.	US\$22.8bn
Shares o/s	506m (COM)
Free float	100%

**Robust Ratebase Remains the Case: exceeds expectations on utility prospects**

With ratebase growth continuing at a 7-9% CAGR target through '21, our 8.4% est lines up nicely against this spending level. In a novel twist relative to the usual updates provided at its Analyst Day, mgmt. outlined the 'upside to the upside' capex, delineating clear near-term ongoing projects that could drive addit'l spend through the period-and enabling visibility to 30B+ ratebase by '26. This incl advanced metering (to be filed likely in parallel with the existing rate case later in '17 for \$1B+ program likely in '19+ period), energy efficiency/solar, grid hardening (incl moving to non-wooden poles). It would appear that bill inflation rather than paucity of investments remains the key impediment with approval from the NJ SPU also a similarly challenging hurdle to justify economics on upgrades. Mgmt. made its case, meeting expectations on concerns for a slowing trajectory after yrs of low-risk successful expansion.

# Death spiral? Industry finances and investment (EEI data)



- Ratebase treatment is a solution in search of all problems
- Generally accepted accounting principles (GAAP) are sometimes seen as a barrier – but regulatory accounting supersedes GAAP
- Cloud computing provides a case study
  - NARUC resolution (2016) maintains a prudent investment test
  - “Regardless of how cloud computing is treated for regulatory accounting purposes, regulators will still examine whether the investment is prudent...”



FEATURE

## Why NARUC wants state regulators to incentivize utility cloud computing

Allowing utilities to earn a return on cloud-based software could help them better serve customers and operate the modern grid

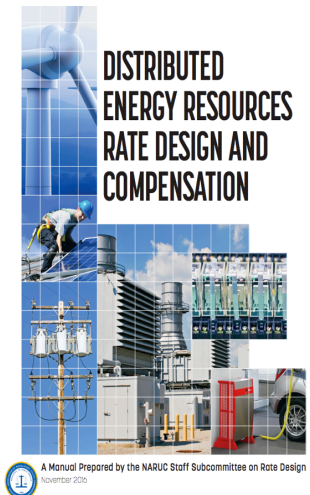
- Is there a throughput incentive?
  - Utilities enjoy higher sales but can do little to effect them but underprice
  - Between cases, they will focus more on what they can control – costs
- Decoupling is meant to “neutralize” the throughput incentive
  - Largely reactive and compensatory – utilities are not “revenue maximizers”
  - Shields utilities from the effects of various changes – including changing consumer preferences and economic conditions
  - As a counterpoint, water usage has fallen dramatically largely without decoupling
- Theoretical issues
  - Disconnecting output from prices
  - Economists critique of revenue caps
  - Overwhelmed by investment incentive ( $r > k$ )



# Incentives that favor high fixed charges

<b>Recovering more costs from fixed charges (static world view)</b>	<b>Recovering more costs from variable charges (dynamic world view)</b>
Enhances revenue stability (less sales revenue risk)	Reduces revenue stability (more sales revenue risk)
Weakens price signals and customer control (less resource efficiency)	Strengthens price signals and customer control (more resource efficiency)
Less affordable for low-income households (more regressive)	More affordable for low-income households (less regressive)
Encourages self supply and grid defection (higher total cost)	Preserves grid supply and participation (lower total cost)
Possible advantage for combined households (one customer charge)	Possible stability from first blocks (relatively inelastic usage)

- Assumptions about scale are changing
  - Prosumerism appears to be on the rise
  - Other demographic trends may contradict
- Utility pricing must consider both efficiency and equity for different customers
  - Interclass and intraclass
  - Program participants and nonparticipants
- Alternative methods of rate design can be accommodated by the traditional paradigm
- Net metering provides a case study

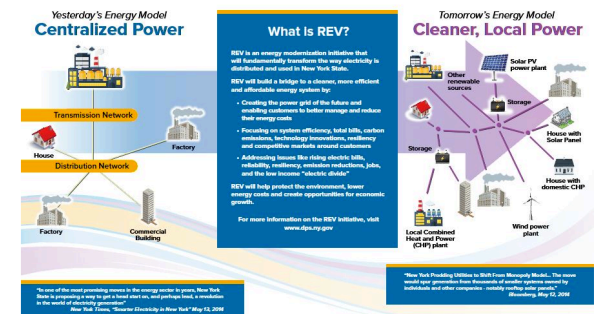


# Incentives that favor the status quo

- Innovation has always been a challenge for public utilities
  - Innovation is not necessarily incompatible with grids, monopoly, or regulation
  - Utilities will benefit from innovation that reduces costs between cases
  - Modernization will involve investment in innovative technologies
- Modern utilities are optimizers under dynamic supply and demand conditions
- New York's REV and UK's RIIO as case studies

## REV: Reforming the Energy Vision

New York State is leading the nation in developing new policies to encourage and reward consumers to use new technologies to control energy use.



# A new prudence: tools for enhancing utility performance

- Real-time digital intelligence & communication platforms, big-data storage, analytics
- Decision support (e.g., construction, supply-chain, project, and risk management)
- Comprehensive and integrated resource planning and portfolio diversification
- Capital asset and ecological planning, management, and control systems
- Contingency planning and security protocols for physical and cyber threats
- Optimization modeling for capital and operating options
- Dynamic load and congestion management technologies and controls
- Spatial imaging, mapping, forecasting, and analysis (e.g., RS, GIS, and SCADA)
- Market mechanisms (e.g., competitive bidding and time-variant pricing)
- Consumer information, services, outreach, and engagement
- Research and development and pilot studies (firm and industry)
- Flexible, adaptive, modular, and resilient infrastructure design

# A new prudence: tools for enhancing regulatory enforcement

- Uniform technical standards, codes, and rules (e.g., franchising, siting, sizing, interconnection, interoperability, and so on)
- Statistical benchmarking and comparative competition with metrics and targets
- Certification of alternative service providers and model contracts
- Informed and consistent rules for cost and risk allocation and rate design
- Technological, structural, and market neutrality in planning and approval
- Empirical analysis of productivity and other performance metrics
- Outcome-based compensation mechanisms (e.g., management or investor bonuses)
- Comprehensive empirical evaluation of programs, services, and customer satisfaction
- Management and performance audits and improvement plans
- Transparent and data-driven compliance monitoring and reporting systems
- Consumer protection rules, procedures, and penalties (e.g., fraud prevention)
- Process improvement, organizational development, research, professional education

**Lisa Schwartz**

Electricity Markets and Policy Group  
Lawrence Berkeley National Laboratory

(510) 486-6315

[licschwartz@lbl.gov](mailto:licschwartz@lbl.gov)

Join Berkeley Lab's Electricity Markets and Policy Group mailing list (<https://emp.lbl.gov/mailling-list>) and stay up to date on our publications, webinars and other events. Follow the Electricity Markets & Policy Group on Twitter @BerkeleyLabEMP