



Energy Technologies Area

Lawrence Berkeley National Laboratory

Performance-Based Regulation in a High Distributed Energy Resources Future

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- Third in series of Lawrence Berkeley National Laboratory reports designed to help better inform discussions underway and decisions by public stakeholders, including regulators and policy makers, as well as industry
- Point-counterpoint approach sharpens debate on tradeoffs in achieving multiple objectives for electricity systems—e.g., reliable, affordable, clean, flexible
- Report authors are thought-leaders in the electric industry
- Primary funder: DOE Office of Electricity Delivery and Energy Reliability—National Electricity Delivery Division
- Additional reports in the series will be funded with support from DOE's Grid Modernization Laboratory Consortium.
- Advisory Group (next page)
 - State regulators, utilities, stakeholders and academia
 - Prioritizes topics, reviews proposed approaches and draft reports



FUTURE ELECTRIC
U t i l i t y R e g u l a t i o n

<https://emp.lbl.gov/future-electric-utility-regulation-series>

- Janice Beecher, Institute of Public Utilities, Michigan State University
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- Karl Rábago, Pace Energy & Climate Center, Pace University School of Law
- Rich Sedano, Regulatory Assistance Project
- Chair Audrey Zibelman, New York State Public Service Commission
- Peter Zschokke, National Grid

1. *Electric Industry Structure and Regulatory Responses in a High DER Future*, Steve Corneli (NRG) and Steve Kihm (Seventhwave)
2. *Distribution Systems in a High DER Future: Planning, Market Design, Operation and Oversight*, Paul De Martini (California Institute of Technology) and Lorenzo Kristov (California Independent System Operator)
3. *Performance-Based Regulation in a High DER Future*, Mark Newton Lowry (Pacific Economics Research Group) and Tim Woolf (Synapse Energy Economics)
4. *Distribution System Pricing for Distributed Energy Resources*, Ryan Hledik (The Brattle Group) and Jim Lazar (Regulatory Assistance Project) - March 2016
5. *Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives*, Lisa Wood (Edison Electric Institute) and Ross Hemphill (RCHemphill Solutions), John Howat (National Consumer Law Center), Ralph Cavanagh (Natural Resources Defense Council) and Severin Borenstein (UC-Berkeley), with an introduction by LBNL - March 2016
6. *The Future of Resource Planning* - Arne Olson and Nancy Ryan (E3) and Andrew Mills and Galen Barbose (LBNL) - April 2016

Mark Newton Lowry is President of Pacific Economics Group Research.

- Active in PBR since 1990s
- Specialties: multi-year rate plans, productivity, performance metrics and benchmarking, decoupling
- Former Penn State University energy economics professor
- PhD Applied Economics, University of Wisconsin

Tim Woolf is Vice President of Synapse Energy Economics.

- 30 years of experience with utility planning and regulation
- Specialties: utility planning and regulation, DSM, IRP, PBR
- Former Massachusetts DPU commissioner (2007-2011)
- MBA, Boston University

Broaden understanding of comprehensive Performance-Based Regulation and its potential role in a high DER future

- Illuminate key elements and the diversity of PBR approaches
- Identify opportunities and challenges for PBR in a high DER future
- Highlight PBR strategy issues
- Inform regulators, utilities, and other stakeholders about how PBR may be implemented given the unique conditions in their jurisdiction
- Describe potential advantages and disadvantages of various PBR options from the utility's and customers' perspectives

COSR Basics

- Base rates adjusted in rate cases
- Rate cases occur as needed
- Trackers for fuel and power costs
- Variable (volumetric and demand) charges collect many “fixed” costs

Incentive Problems

- Incentives vary with rate case frequency and prevalence of trackers
- Financial incentive to increase rate base
- Financial incentive to increase sales
- Utilities under COSR have a disincentive to accommodate DERs, even when DERs meet customer needs at lower cost.
- Rapid DER penetration, by increasing rate case frequency, can erode utility cost performance just when good performance is most needed to address competition.

- Regulation designed to improve utility performance with stronger incentives
- PBR is a term used to cover a variety of mechanisms to improve incentives and performance
- Two common components of PBR:
 - Multi-year rate plans (MRPs)
 - Performance incentive mechanisms (PIMs)
 - These are often used together
- PBR is rarely applied uniformly; there are many permutations possible

Objective

- Provide financial incentive for utility to increase efficiency and reduce utility costs. Reduced costs should ultimately benefit customers.

Key Components

- Rate case moratorium
- Attrition relief mechanism (ARM) provides automatic relief for increasing cost pressures, but is not linked to a utility's actual costs
- Performance incentive mechanisms for reliability, safety, etc.

Optional Components

- Revenue decoupling
- Earnings sharing mechanism
- Efficiency carryover mechanism
- Marketing flexibility
- Cost trackers

Objective

- Provide utilities with (a) guidance regarding specific performance goals and (b) financial incentives to meet regulatory targets

Key Components

- Regulatory policy goals – identifying performance areas and outputs
- Metrics – detailed information regarding utility performance
- Targets – requirement to achieve specific goals
- Financial incentives – based on performance relative to targets

PIMs can be implemented gradually in stages.

Scorecards can be used to illuminate performance.

Financial incentives offer the greatest incentive, and the most risk.

Multi-Year Rate Plans (MRPs)

- Used since 1980s to regulate utility industries facing competition
- (e.g., railroads, telcos, oil pipelines)
- Used for U.S. electric utilities since 1990s
- California, New York, New England were early adopters
- Increased use by vertically integrated electric utilities
- More common in other countries (e.g., Australia, Canada, Britain)

Performance Incentive Mechanisms (PIMs)

- Have been used for many years in several performance areas requiring specific attention and incentives
- Frequently used in multiyear rate plans to prevent service degradation
- Most widely used in the United States for demand-side management (DSM)

Builds off of 20-year history of PBR in Britain

Multi-year rate plan features:

- 8-year plan term
- Revenue decoupling
- Attrition Relief Mechanism based on:
 - detailed cost forecasts for 8-year term
 - extensive use of statistical benchmarking & engineering
- Incentive compatible menu of revenue and earnings sharing options
 - A utility can choose a plan with lower allowed revenues but with the ability to keep a larger proportion of any cost savings, or a utility can choose higher revenues but with a lower proportion of any savings
- Elaborate system of performance metrics and PIMs
- “Totex” approach:
 - Rate of return earned on a % of total expenditures, regardless of whether they are capital or operational expenditures

COSR Elements Compared to PBR

Ratemaking Elements	COSR	Performance-Based Regulation		
		Stand-Alone PIMs	MRP	RIIO
Rate Case Moratorium	---	---	Yes	Yes
Attrition Relief Mechanism (ARM)				
Forecast-based ARM	---	---	Sometimes	Yes
Index-based ARM	---	---	Sometimes	---
Hybrid ARM	---	---	Sometimes	---
Marketing/Pricing Flexibility	Occasionally	---	Sometimes	---
Earnings Sharing Mechanisms	---	---	Sometimes	Yes
Efficiency Carry-over Mechanisms	---	---	Sometimes	---
Performance Incentive Mechanisms	---	Yes	Usually	Yes
Revenue Regulation (Decoupling)	Sometimes	Sometimes	Sometimes	Yes

Advantages

- Improved utility performance and lower utility costs
- Benefits can be shared with customers
- Less frequent rate cases may permit more attention to other important issues
- May improve information transparency regarding utility performance
- Can encourage implementation of cost-effective DERs
- Can be implemented gradually

Disadvantages

- Typically results in automatic rate increases
- Revenue may exceed cost for extended periods
- Fewer rate cases means less frequent opportunities to review costs
- ARM design methods can be opaque, complex and controversial
- U.S. intervenors may lack resources and skills to effectively protect consumers

Advantages

- Timely, predictable revenue growth
- Superior returns possible for superior performance
- Greater marketing flexibility
- Improved performance can be an important new earnings driver
- Better performance needed in period of mounting competition
- Better performers more likely to make successful mergers and acquisitions
- Utilities typically have expertise to support their MRP proposals
- Streamlined regulation, a particular benefit for companies with multiple utilities

Disadvantages

- Operating risk may increase materially
- Corresponding increase in target ROE unlikely
- Difficult to accommodate occasional cost surges
- Greater focus on a utility's comparative performance

Advantages

- Can encourage better utility performance in areas of concern
- Can make regulatory goals and incentives explicit
- May help mitigate utility bias toward capital investments
- Can be designed to directly benefit customers
- Can help ensure cost-cutting doesn't degrade service quality or safety
- PIMs for DERs can be designed to encourage cost-effective DERs
- Metrics serve as a low-risk, low-cost option for highlighting and monitoring key performance areas

Disadvantages

- Design, implementation, and review may be complex, contentious and resource intensive
- May distract from more important issues
- Design of PIMs may favor utilities, be subject to gaming and manipulation, or lead to unintended consequences
- Incentives may be insufficient to achieve goals
- Important performance areas may not be addressed

Advantages

- Alert utility managers to areas of special concern to customers and regulators
- Provide new earnings opportunities
- PIMs for DSM and many experimental metrics likely to involve rewards but no penalties
- Risks and rewards are in balance
- Help to maintain good relations with regulators and customers
- Price of admission for access to desirable forms of regulation (e.g. multi-year rate plans and formula rates)

Disadvantages

- Financial rewards may be small due to low stakes and narrow focus
- Some PIMs involve only penalties
- Some PIMs may address areas that are largely outside of utility control
- Targets may be unreasonably difficult to meet
- May be resource-intensive and distract from core goals

What Are the Key Challenges With MRPs?

MRPs ➡ More efficient utility incentives ➡ Cost savings

Concerns:

- The ARMs are complex and can be gamed.
- Increased efficiency is not guaranteed.
- The utility might unduly defer capital expenditures.
- Benefits of reduced costs might not flow to customers.
- Less frequent rate cases mean fewer opportunities to review costs.

On the other hand, some MRP mechanisms can help:

- Productivity factors
- Duration of rate plan period
- Earnings sharing mechanism
- Efficiency carryover mechanism
- Stretch factors

However:

- Do these work as intended?
- Do these undermine the incentives to the utility?

These considerations help to explain recent slow growth of MRPs.

What Are the key Challenges with PIMs?

Over- compensation

Potential solutions:

- Use an incremental approach: start low and monitor over time.
 - Careful PIM design (e.g., shared savings)
-

Unintended consequences

Potential solutions:

- Focus on performance areas that are isolated from others.
 - Be cautious of implications for other performance areas.
 - Consider implementing a diverse, balanced set of incentives.
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Uncertainty

Potential solutions:

- Carefully specify metric and target definitions, soliciting utility and stakeholder input where possible.
 - Adjust target incentives cautiously to reduce uncertainty and encourage utilities to make investments with long-term benefits.
-

Gaming and Manipulation

Potential solutions:

- Identify verification measures.
- Consider using independent third parties to collect or verify data.
- Avoid complex data analysis techniques that are difficult to audit and reduce transparency.

Can PBR Provide Improved Guidance in a High DER-Future?

COSR: Provides incentive to promote sales and capital investments, both of which hinder development of DER

MRPs:

- Decoupling can eliminate sales incentive
- MRP strengthens general incentive for utility to cut costs

MRP limits:

- The utility does not keep benefits of reduced fuel or purchased power costs
- Utility has little positive financial incentive to promote DERs

PIMs:

- Provide clear targets and incentives regarding DERs

PIM limits:

- Financial incentive might not be large enough
- Requires significant regulatory oversight

Takeaway: Both may be necessary to overcome COSR incentives. Either way, regulators must be engaged.

Options for Different Contexts and Goals

Performance Improvement Goals	Openness to Regulatory Change	PBR Options
None	Low	Maintain current ratemaking practice
Improvement in specific areas	Low	Adopt PIMs for specific areas
General improvement in utility performance Streamlined regulation	Moderate to high	Adopt an MRP
Support DERs	Low	Adopt PIMs for DER <i>or</i> revenue regulation
Support DERs	Moderate	Adopt PIMs for DERs <i>and</i> revenue regulation
Support for DERs General improvement in utility performance Streamlined regulation	High	Adopt PIMs for DERs, an MRP, and revenue regulation

Additional Slides

Stand-Alone PIMs

- Can be implemented without significant regulatory change
- MRPs can be hard to negotiate
- More marketing flexibility may not be needed
- The regulatory cost savings of MRPs might not be a priority

MRPs

- Stronger, more wide ranging performance incentives
- Strengthened incentives for DERs
- Some regulators and stakeholders amenable to MRPs
- Facilitates marketing flexibility
- Can reduce regulatory cost
 - RIIIO PIMs with heavy financial weights are due to 8 year MRP; RIIIO does not presage a world of numerous stand-alone PIMs with heavy weights

Key takeaways: Both offer advantages; they address different issues; and there is no need to choose between them.

Aspects worth considering

- Menu approach in ARM design
- Use of “totex” approach in setting revenue requirements
- Inflation indexing of forecasted revenue requirement
- Fast-track treatment of reasonable proposals

Aspects that raise concerns

- Development of business plans highly complex and burdensome
- Eight years between rate cases:
 - Pre-approval of utility investment creates risks to both utilities and customers.
 - May not allow for new technologies that emerge between rate cases
- North American regulation offers several advantages not in RIIO (e.g., ARMs based on index research, better benchmarking)

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