Performance-Based Regulation in a High Distributed Energy Resources Future

January 27, 2016

Mark Newton Lowry, President, Pacific Economics Group Research

Tim Woolf, Vice President, Synapse Energy Economics
Introduction to the Series – Lisa Schwartz

• 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

https://emp.lbl.gov/future-electric-utility-regulation-series
Advisory Group

- Janice Beecher, Institute of Public Utilities, Michigan State University
- Ashley Brown, Harvard Electricity Policy Group
- Paula Carmody, Maryland Office of People’s Counsel
- Ralph Cavanagh, Natural Resources Defense Council
- Commissioner Michael Champley, Hawaii Public Utilities Commission
- Steve Corneli, NRG
- Commissioner Mike Florio, California Public Utilities Commission
- Peter Fox-Penner, Boston University Questrom School of Business
- Scott Hempling, attorney
- Val Jensen, Commonwealth Edison
- Steve Kihm, Seventhwave
- Commissioner Nancy Lange, Minnesota Public Utilities Commission
- Ben Lowe, Duke Energy
- Sergej Mahnovski, Consolidated Edison
- Kris Mayes, Arizona State University College of Law/Utility of the Future Center
- Jay Morrison, National Rural Electric Cooperative Association
- Allen Mosher, American Public Power Association
- Sonny Popowsky, Former consumer advocate of Pennsylvania
- 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)


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


6. *The Future of Resource Planning* - Arne Olson and Nancy Ryan (E3) and Andrew Mills and Galen Barbose (LBNL) - April 2016
About the Authors

**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
Report Objectives

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
Traditional Cost of Service Regulation (COSR)

**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.
Performance-Based Ratemaking

• 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:
  o Multi-year rate plans (MRPs)
  o Performance incentive mechanisms (PIMs)
  o These are often used together

• PBR is rarely applied uniformly; there are many permutations possible
Multi-Year Rate Plans

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
Performance Incentive Mechanisms

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.
**PBR Precedents**

**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)
Case Study: Britain’s RIIO Approach to PBR

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

<table>
<thead>
<tr>
<th>Ratemaking Elements</th>
<th>COSR</th>
<th>Performance-Based Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stand-Alone PIMs</td>
<td>MRP</td>
</tr>
<tr>
<td>Rate Case Moratorium</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Attrition Relief Mechanism (ARM)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Forecast-based ARM</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Index-based ARM</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Hybrid ARM</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Marketing/Pricing Flexibility</td>
<td>Occasionally</td>
<td>---</td>
</tr>
<tr>
<td>Earnings Sharing Mechanisms</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Efficiency Carry-over Mechanisms</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Performance Incentive Mechanisms</td>
<td>---</td>
<td>Yes</td>
</tr>
<tr>
<td>Revenue Regulation (Decoupling)</td>
<td>Sometimes</td>
<td>Sometimes</td>
</tr>
</tbody>
</table>
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?

<table>
<thead>
<tr>
<th>Concerns:</th>
<th>On the other hand, some MRP mechanisms can help:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The ARMs are complex and can be gamed.</td>
<td>• Productivity factors</td>
</tr>
<tr>
<td>• Increased efficiency is not guaranteed.</td>
<td>• Duration of rate plan period</td>
</tr>
<tr>
<td>• The utility might unduly defer capital expenditures.</td>
<td>• Earnings sharing mechanism</td>
</tr>
<tr>
<td>• Benefits of reduced costs might not flow to customers.</td>
<td>• Efficiency carryover mechanism</td>
</tr>
<tr>
<td>• Less frequent rate cases mean fewer opportunities to review costs.</td>
<td>• Stretch factors</td>
</tr>
</tbody>
</table>

These considerations help to explain recent slow growth of MRPs.
<table>
<thead>
<tr>
<th>Challenge</th>
<th>Potential solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over-compensation</td>
<td>• Use an incremental approach: start low and monitor over time.</td>
</tr>
<tr>
<td></td>
<td>• Careful PIM design (e.g., shared savings)</td>
</tr>
<tr>
<td>Unintended consequences</td>
<td>• Focus on performance areas that are isolated from others.</td>
</tr>
<tr>
<td></td>
<td>• Be cautious of implications for other performance areas.</td>
</tr>
<tr>
<td></td>
<td>• Consider implementing a diverse, balanced set of incentives.</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>• Carefully specify metric and target definitions, soliciting utility and stakeholder input where possible.</td>
</tr>
<tr>
<td></td>
<td>• Adjust target incentives cautiously to reduce uncertainty and encourage utilities to make investments with long-term benefits.</td>
</tr>
<tr>
<td>Gaming and Manipulation</td>
<td>• Identify verification measures.</td>
</tr>
<tr>
<td></td>
<td>• Consider using independent third parties to collect or verify data.</td>
</tr>
<tr>
<td></td>
<td>• Avoid complex data analysis techniques that are difficult to audit and reduce transparency.</td>
</tr>
</tbody>
</table>
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

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

Energy Analysis and Environmental Impacts Division
Additional Slides
## Are Stand-Alone PIMs Better Than MRPs?

### 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
  - RIIO PIMs with heavy financial weights are due to 8 year MRP; RIIO 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.
What Can the U.S. Learn From RIIO?

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)
Author Contact Information

**Mark Newton Lowry**
President
Pacific Economics Group ("PEG") Research
608-257-1522
mnlowry@pacificeconomicsgroup.com
www.pacificeconomicsgroup.com

**Tim Woolf**
Vice President
Synapse Energy Economics
617-453-7031
twoolf@synapse-energy.com
www.synapse.energy.com
For More Information on the Series

Lisa Schwartz
Electricity Markets and Policy Group
Lawrence Berkeley National Laboratory
(510) 486-6315
lcschwartz@lbl.gov