Recent Trends in Electric Utility Regulation

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Montpelier VT

12 September 2017

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Introduction

US electric utilities are in period of rapid change

Performance Based Regulation ("PBR") and other alternatives to traditional cost of service regulation ("COSR") are increasingly used to address change

This presentation

- explains PBR and other options
- notes key precedents & recent developments
- highlights findings from my new Berkeley Lab paper
- stresses "utility of the future" challenges/opportunities

Plan of Presentation

- Context: The Winds of Change
- Adjustments to Traditional Rate Regulation
- Performance-Based Regulation
  - Targeted Performance Incentive Mechanisms
  - Multiyear Rate Plans

Context: The Winds of Change

Cost of Service Regulation

COSR Basics

- Base rates adjusted occasionally rate cases
- Tracker/rider treatment of energy expenses
- Usage (e.g., volumetric and demand) charges collect many “fixed” costs

Sensitivity to Business Conditions

•Utility performance and regulatory cost vary with business conditions (e.g., inflation and average use trends)

- When conditions are *favorable* to utilities, rate cases are infrequent so regulatory cost is low and performance incentives are strong
- When conditions are *chronically unfavorable*, rate cases are frequent. Regulatory cost is high, performance incentives are weakened, and operating flexibility is restricted
- Performance can deteriorate just when good performance is needed

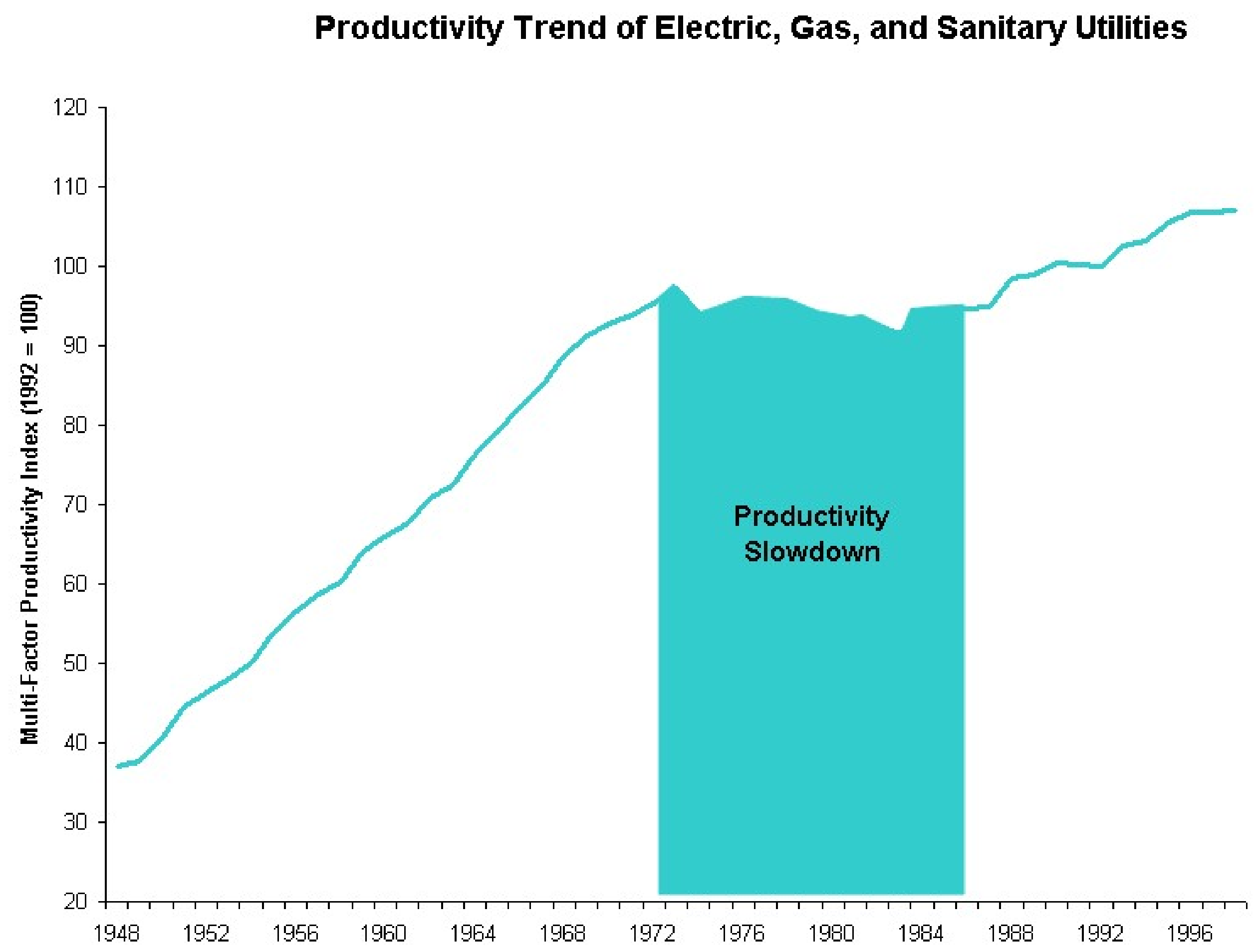
Indicators of Financial Attrition 1931-2014

	Average Annual Electricity Use					GDPPI Inflation[2]		Summary Attrition Indicator
	Residential[1]		Commercial[1]		Average			
	Level	Growth Rate	Level	Growth Rate	Growth Rate	Level	Growth Rate	
Multiyear Averages					[A]		[C]	[C]-[A]
1931-1940	723	5.45%	4,048	2.00%	3.73%	7.99	-1.59%	-5.31%
1941-1950	1,304	6.48%	6,485	5.08%	5.78%	11.37	5.26%	-0.52%
1951-1960	2,836	7.53%	12,062	6.29%	6.91%	16.04	2.42%	-4.49%
1961-1972	5,603	5.79%	31,230	8.79%	7.29%	20.35	2.98%	-4.32%
1973-1980	8,394	2.03%	50,576	2.53%	2.28%	34.74	7.18%	4.90%
1981-1986	8,820	0.12%	54,144	0.81%	0.46%	54.22	4.57%	4.11%
1987-1990	9,424	1.39%	60,211	2.29%	1.84%	63.32	3.33%	1.49%
1991-2000	10,061	1.15%	67,006	1.68%	1.41%	75.70	2.03%	0.62%
2001-2007	10,941	0.73%	74,224	0.64%	0.68%	89.83	2.47%	1.79%
2008-2014	11,059	-0.38%	75,311	-0.22%	-0.30%	103.53	1.60%	1.90%

[1] U.S. Department of Energy, Energy Information Administration, Form EIA-861, "Annual Electric Utility Report," and Form EIA-826, "Monthly Electric Utility Sales and Revenues Report with State Distributions," and EIA-0035, "Monthly Energy Review."

[2] Bureau of Economic Analysis, Table 1.4.4. Price Indexes for Gross Domestic Product, Gross Domestic Purchases, and Final Sales to Domestic Purchasers, Revised October 28, 2016.

>>> Key business conditions are much less favorable today than in COSR's "golden age" when it became a tradition



>>> Utility performance deteriorated in period of frequent rate cases

Need for Capex

Need for capex varies between vertically integrated electric utilities ("VIEUs") and utility distribution companies ("UDCs")

UDCs

Many utilities need sustained high non-revenue producing capex to modernize & harden distribution systems

>>> Many UDCs need larger, more frequent rate increases

However, capex plans can be challenging in era of rapid technical change and growing DER penetration.

Need for Capex (cont'd)

VIEUs

VIEUs need fewer generating plant additions

Additions that *are* needed are smaller, more modular

Depreciation of older generation plant slows cost growth

High distribution capex has less % impact on VIEUs than on UDCs

>>> VIEUs… are experiencing slower, steadier cost growth
need smaller but more frequent rate hikes than in past

COSR Today

Current business conditions can require frequent rate cases (especially for UDCs). Under typical (e.g., 2-3 year) rate case cycle…

- Little profit from improved performance >>> weak performance incentives
- Rate base growth main path to earnings growth
- Regulators discourage marketing flexibility (e.g., limited rate and service offerings)
- Limited regulatory resources for other worthwhile activities
  - (e.g., generic proceedings, rate design, review of multiyear business plans)

COSR Today (cont'd)

Electric utilities don't benefit much from DSM and DGS

- Declining average use reduces sales between rate cases
- Rate designs that encourage efficient DSM and DGS are risky
- Many load-related costs (e.g., energy procurement and transmission) are tracked

>>> COSR incentivizes utilities to resist DSM & DGS

Some regulators acknowledge incentive problems and their cost to customers

This initiative proceeds from the assumption that rate-base rate of return regulation offers few incentives to improve efficiency, and produces incentives for regulated companies to maximize costs and inefficiently allocate resources… Regulators … must critically analyze in detail management judgments and decisions that, in competitive markets and under other forms of regulation, are made in response to market signals and economic incentives. The role of the regulator in this environment is limited to second guessing…The Commission is seeking a better way to carry out its mandate so that the legitimate expectations of the regulated utilities and of customers are respected.

Alberta Utilities Commission, "AUC letter of February 26, 2010," pages 1-2, Exhibit 1.01 in Proceeding 566.

Adjustments to Traditional Rate Regulation

New Regulatory Frameworks

Problems with COSR have spurred adjustments to regulatory systems

Options are diverse

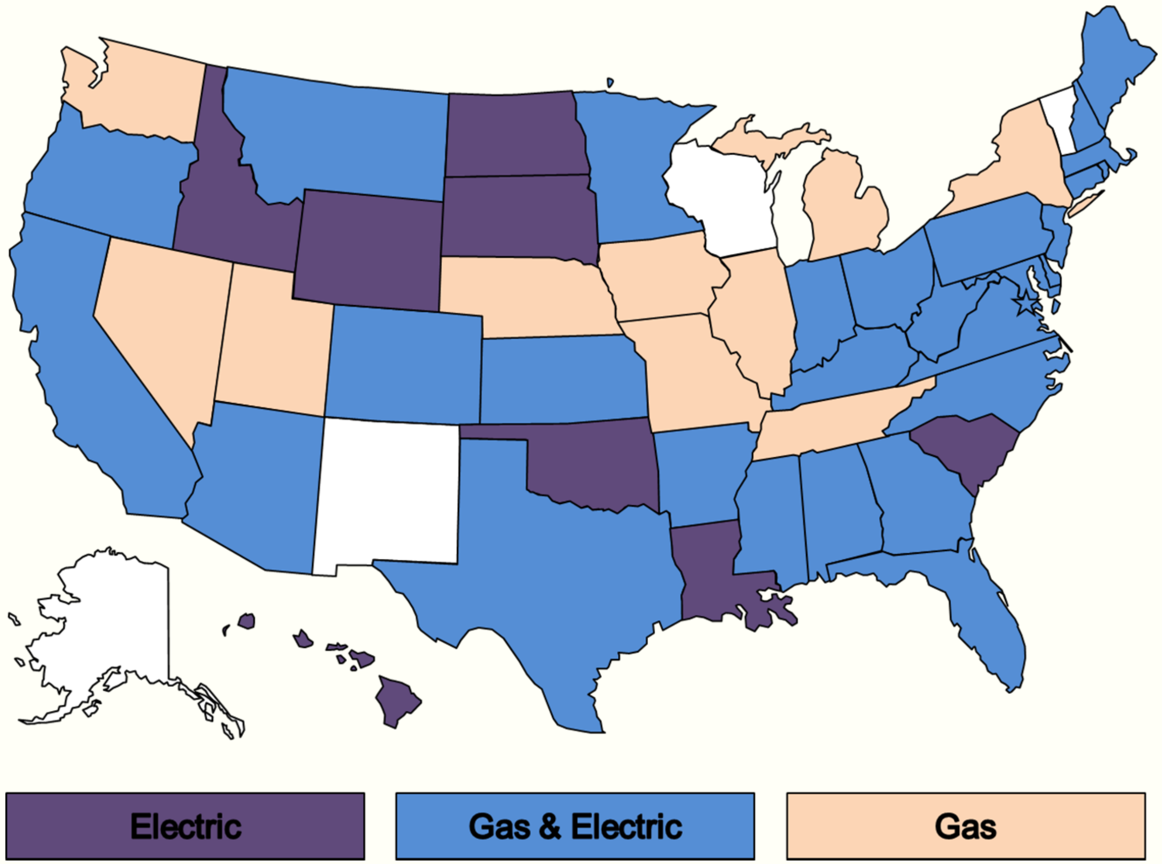
Targeted Adjustments

- Cost Trackers
- Revenue Decoupling
- Targeted Performance Incentive Mechanisms ("PIMs")

Comprehensive Adjustments

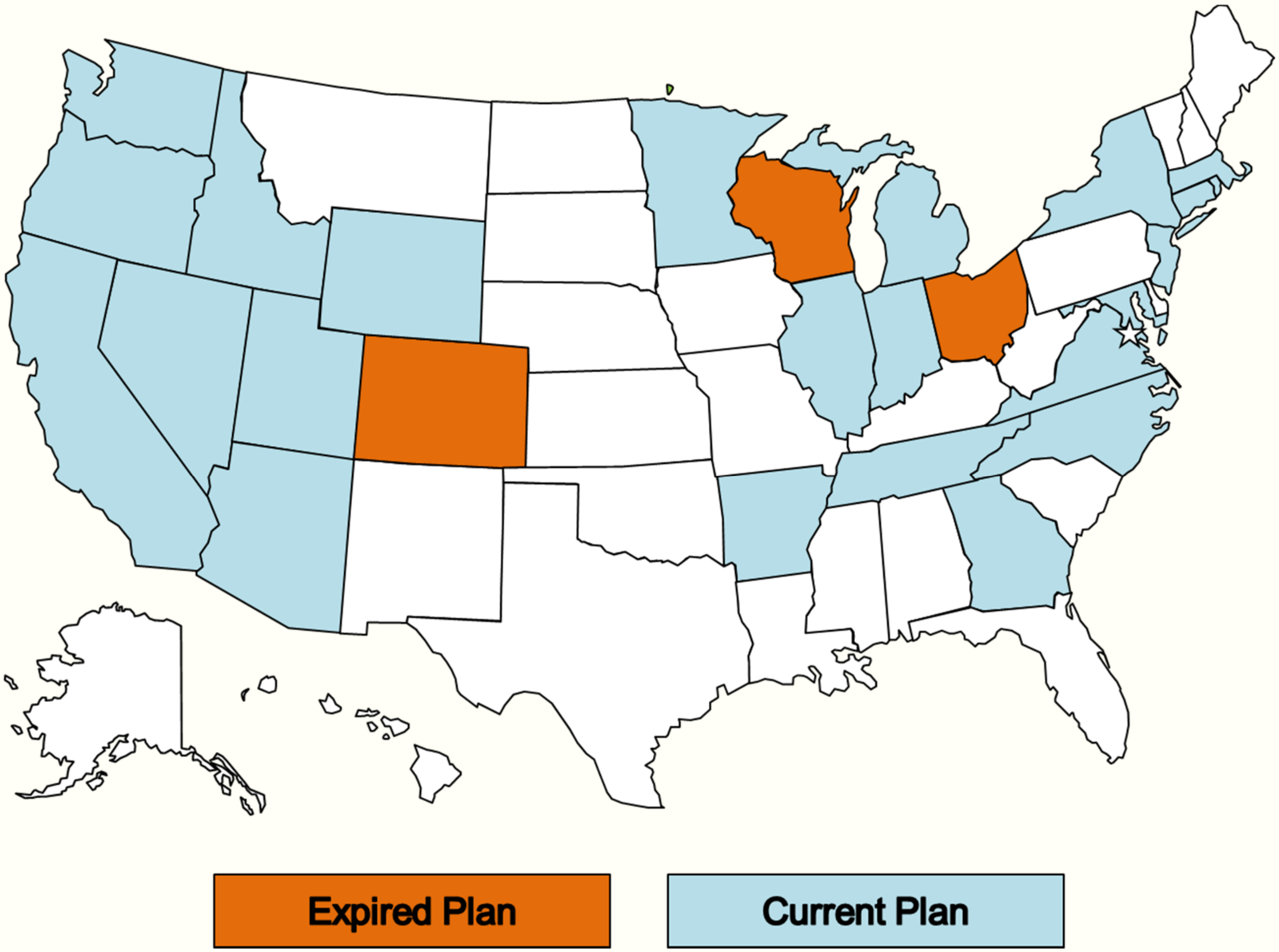
- Integrated Distribution Planning
- Formula Rate Plans
- Multiyear Rate Plans ("MRPs")

Capital Cost Tracker Precedents

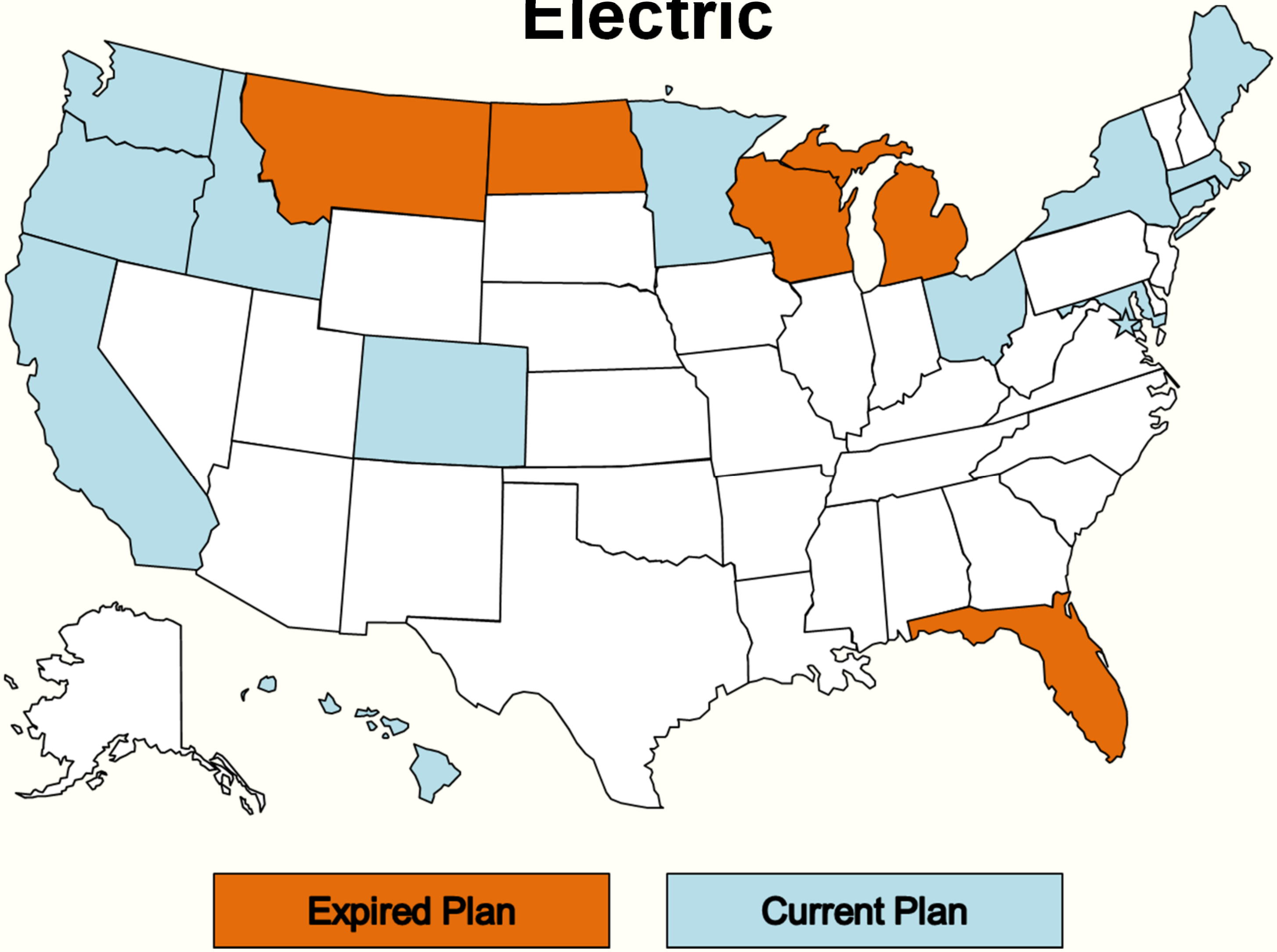


Ohio & Massachusetts have *comprehensive* capital cost trackers for Dx

Revenue Decoupling Precedents: Gas



Revenue Decoupling Precedents: Electric



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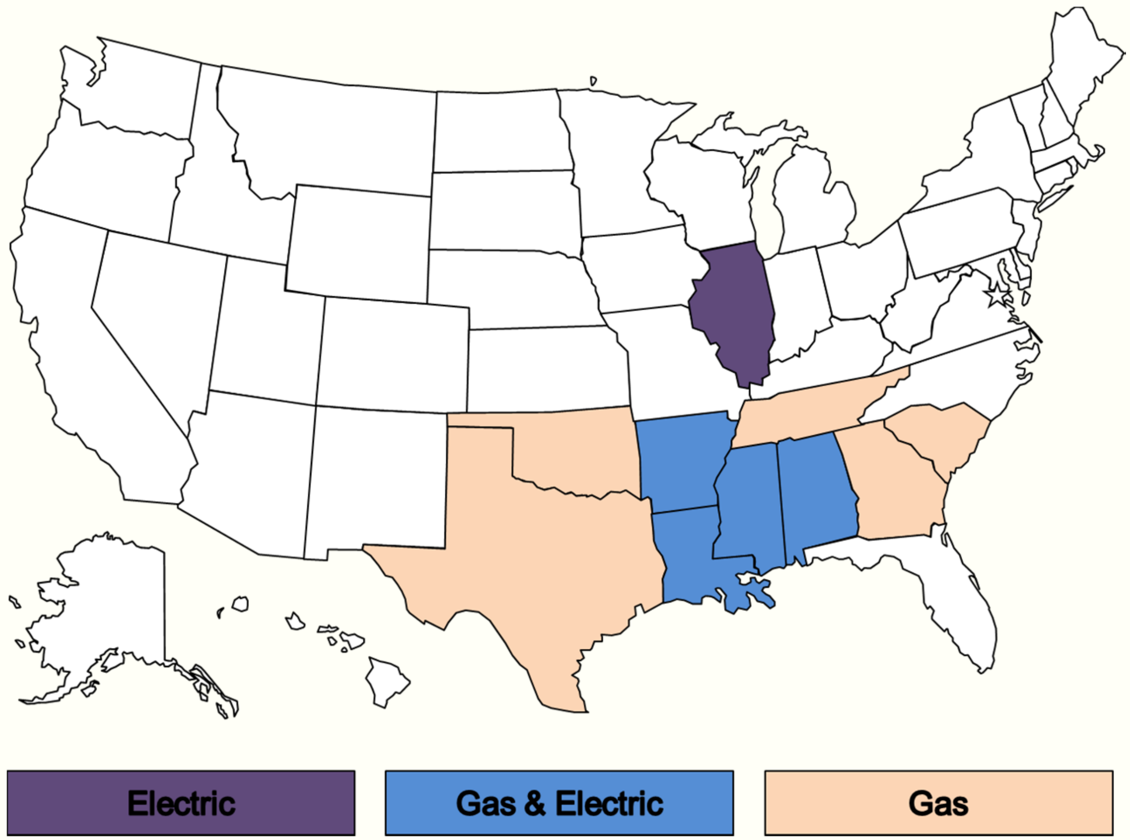
Current Retail Formula Rate Plan Precedents



Formula rates more common in federal power transmission regulation

Performance-Based Regulation ("PBR")

Performance-Based Regulation

PBR: Regulation designed to improve utility performance with stronger incentives

3 established approaches (can be used in combination):

- Targeted Performance Incentive Mechanisms
- Multiyear Rate Plans ("MRPs")
- Incentivized Cost Trackers

Performance Metrics

Performance metrics quantify utility activities in key performance areas

Several potential uses

- Monitoring Only
- Monitoring with Target
- Performance Incentive Mechanisms ("PIMs")

Performance metric systems can involve different approaches for different metrics

PIMs strengthen incentives in targeted areas by linking revenue to performance appraisals

"Scorecards" summarize utility performance using multiple metrics

Scorecard - Hydro Ottawa Limited

9/28/2015

Performance Outcomes	Performance Categories	Measures		2010	2011	2012	2013	2014	Trend	Target: Industry	Target: Distributor
Customer Focus Services are provided in a manner that responds to identified customer preferences.	Service Quality	New Residential/Small Business Services Connected on Time		100.00%	100.00%	100.00%	100.00%	100.00%	flat	90.00%	
		Scheduled Appointments Met On Time		100.00%	97.30%	97.40%	97.40%	98.30%	down	90.00%	
		Telephone Calls Answered On Time		82.10%	82.90%	82.50%	82.20%	80.30%	down	65.00%	
	Customer Satisfaction	First Contact Resolution					85.2%	84.1%			
		Billing Accuracy					99.6%	99.61%	flat	98.00%	
		Customer Satisfaction Survey Results					90%	83%			
Operational Effectiveness Continuous improvement in productivity and cost performance is achieved; and distributors deliver on system reliability and quality objectives.	Safety	Level of Public awareness [measure to be determined]									
		Level of Compliance with Ontario Regulation 22/04		NI	NI	C	C	C	up		C
		Serious Electrical Incident Index	Number of General Public Incidents	1	0	1	0	1	flat		0
			Rate per 10, 100, 1000 km of line	0.186	0.000	0.178	0.000	0.182	flat		0.076
	System Reliability	Average Number of Hours that Power to a Customer is Interrupted		1.05	2.44	1.31	1.64	1.59	up		at least within 1.05 - 2.44
		Average Number of Times that Power to a Customer is Interrupted		0.77	1.40	1.13	1.36	0.86	up		at least within 0.77 - 1.40
	Asset Management	Distribution System Plan Implementation Progress					105%	94%			
	Cost Control	Efficiency Assessment				3	3	3			
		Total Cost per Customer [1]		$536	$529	$569	$579	$623			
		Total Cost per Km of Line [1]		$29,776	$28,793	$31,107	$33,222	$36,169			
Public Policy Responsiveness Distributors deliver on obligations mandated by government (e.g., in legislation and in regulatory requirements imposed further to Ministerial directives to the Board).	Conservation & Demand Management	Net Annual Peak Demand Savings (Percent of target achieved) [2]			14.13%	28.85%	45.57%	70.53%	target not met		85.26MW
		Net Cumulative Energy Savings (Percent of target achieved)			37.74%	65.64%	88.69%	110.71%	target met		374.73GWh
	Connection of Renewable Generation	Renewable Generation Connection Impact Assessments Completed On Time		100.00%	100.00%	100.00%	100.00%	100.00%			
		New Micro-embedded Generation Facilities Connected On Time					100.00%	100.00%		90.00%	
Financial Performance Financial viability is maintained; and savings from operational effectiveness are sustainable.	Financial Ratios	Liquidity: Current Ratio (Current Assets/Current Liabilities)		1.45	1.43	1.18	1.07	0.86			
		Leverage: Total Debt (includes short-term and long-term debt) to Equity Ratio		1.22	1.32	1.37	1.64	1.65			
		Profitability: Regulatory Return on Equity	Deemed (included in rates)		8.57%	9.42%	9.42%	9.42%			
			Achieved		7.86%	9.41%	7.80%	8.06%			

Notes:
1. These figures were generated by the Board based on the total cost benchmarking analysis conducted by Pacific Economics Group Research, LLC and based on the distributor's annual reported information.
2. The Conservation & Demand Management net annual peak demand savings include any persisting peak demand savings from the previous years.

Legend: up · down · flat · target met · target not met

Rationale for PIMs

Strengthen utility incentives where they are weak

Traditional focus

- Reliability
- Customer Service Quality
- Energy Conservation (provides "positive" incentives)
- Generator Performance
- Safety

Utility of the Future PIMs

Need for new performance metrics and incentive mechanisms is focus of recent "utility of the future" proceedings

Peak load management

- System load peakedness
- Non-wire Performance Baseds ("NWAs") to local grid investments *e.g.* Brooklyn-Queens Demand Management Project

Utilization of AMI capabilities

Quality of service to DSG customers

Leading jurisdictions (e.g. CA, MN, NY, and Britain) are also MRP practitioners

Multiyear Rate Plans

Key Components

- Rate case moratorium (e.g., 3-5 year rate case cycle)
- Attrition relief mechanism ("ARM") provides automatic relief for cost pressures *but is not linked to utility's actual costs*
- Trackers for some costs (e.g. energy)
- Performance metric system includes service quality PIMs

Optional Components

- Revenue decoupling
- Earnings sharing mechanisms
- Marketing flexibility
- Additional PIMs (e.g., for conservation)
- Efficiency carryover mechanisms reward long-term performance gains that benefit customers

MRP Rationale

Streamlined regulation

Fewer, less overlapping rate cases free resources to address other issues

Balanced, stronger performance incentives

Increased operating (e.g., marketing) flexibility

Revenue tracks utility's *own* cost less closely

Fourth "leg" for the DSM (and distributed generation) "stool" doesn't require complicated load impact studies

1) Revenue decoupling
2) Tracking of DSM Expenses
3) DSM Performance Incentive Mechanisms
4) MRP strengthens incentive to use DSM to contain cost

Marketing Flexibility

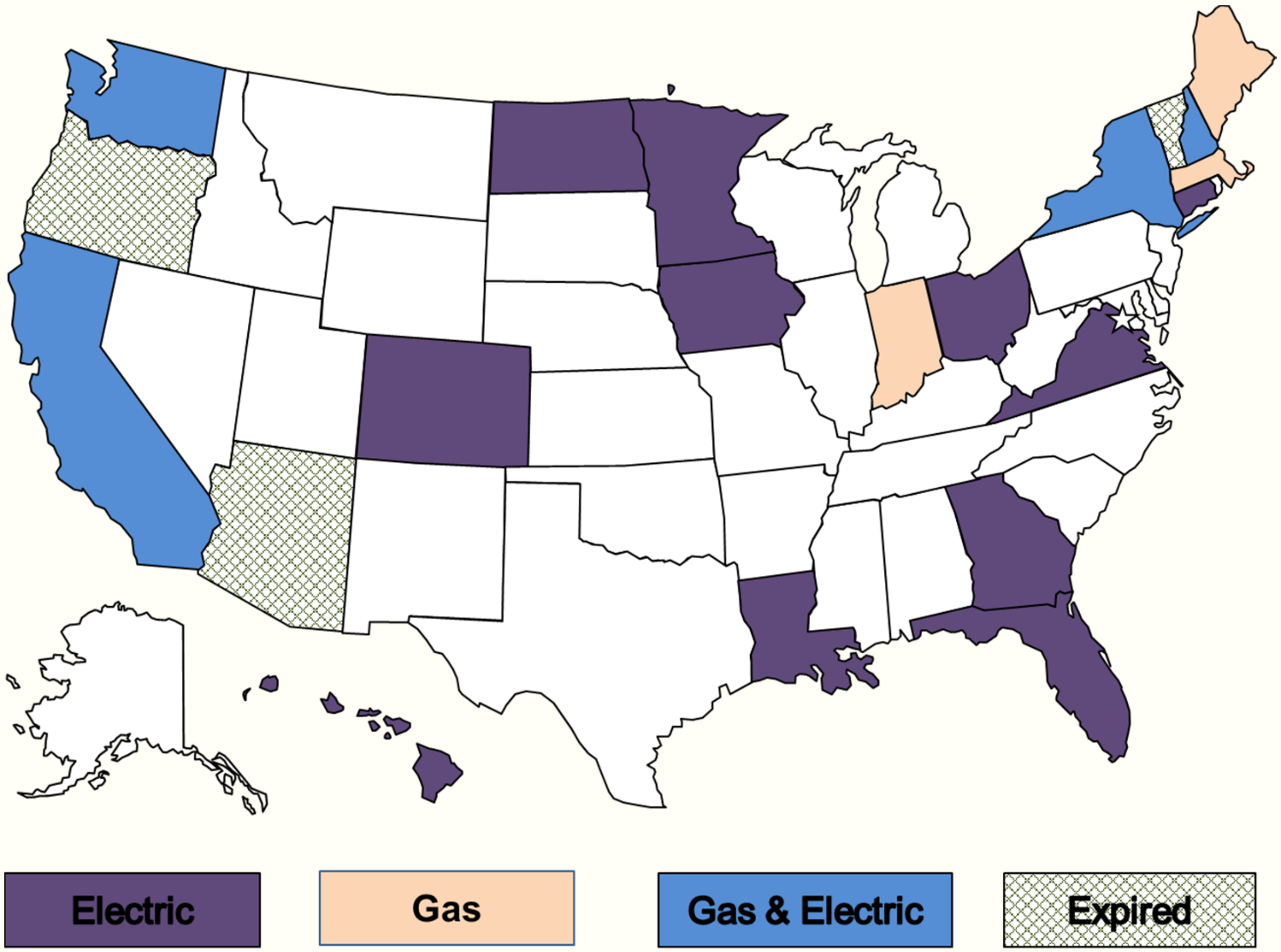
MRPs can afford utilities more flexibility by reducing rate case frequency and opportunities for cross-subsidization

e.g., "Streamlined regulation" of

- Special contracts
- Optional tariffs and services
    - Green power packages (utility scale and distributed)
    - Energy transformation services (e.g., EV charging, heat pump leasing
    - Reliability-differentiated services
    - Other smart-grid-enabled services

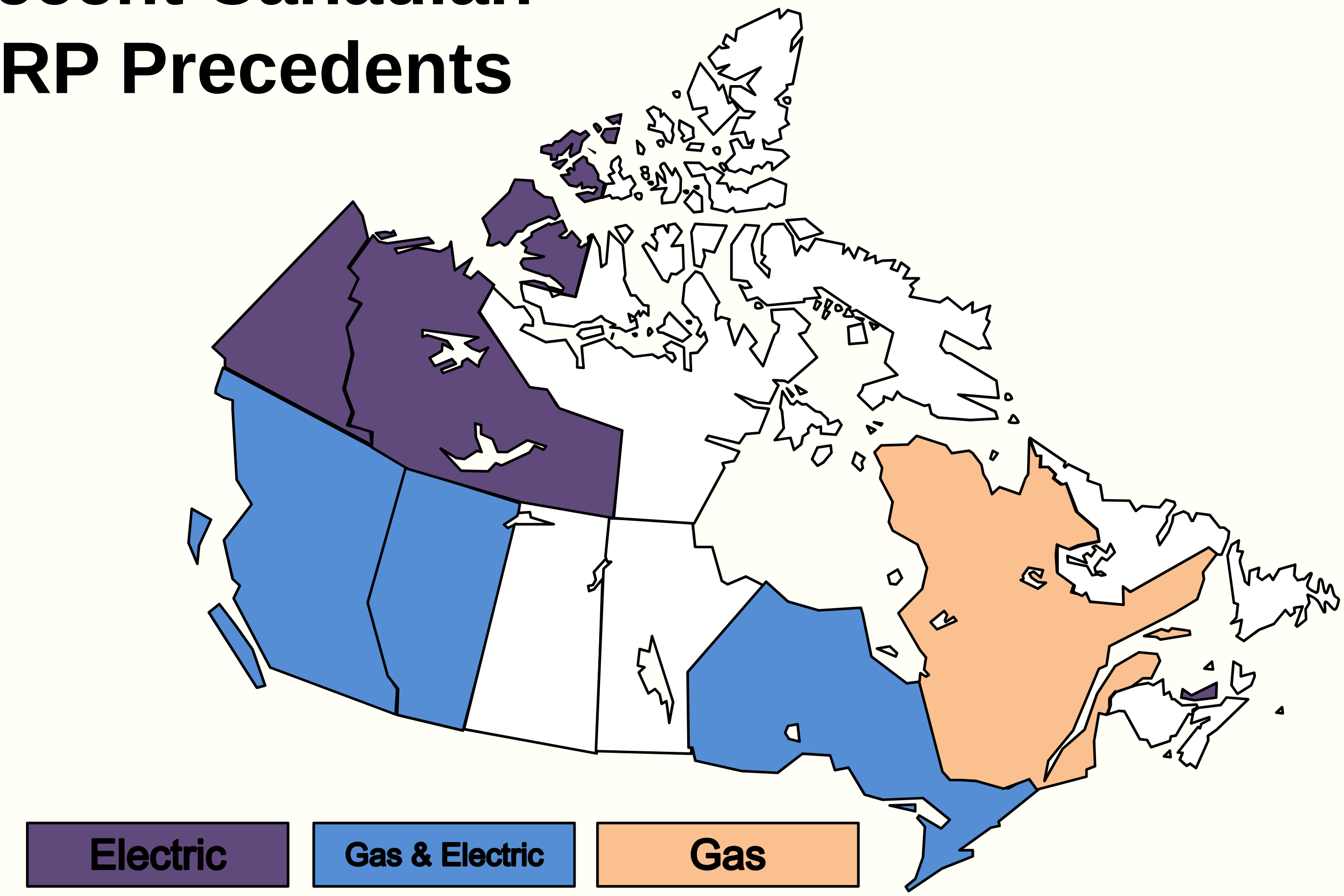
MRPs have been popular in utility industries facing competition, technical change, and complex, changing demand (e.g. telecommunications)

Multiyear Rate Plan Precedents: US



Use of MRPs growing rapidly, especially for VIEUs

Recent Canadian MRP Precedents



MRPs mandatory in populous Canadian provinces and many countries overseas (e.g. Australia, Great Britain, NZ)

ARM Design

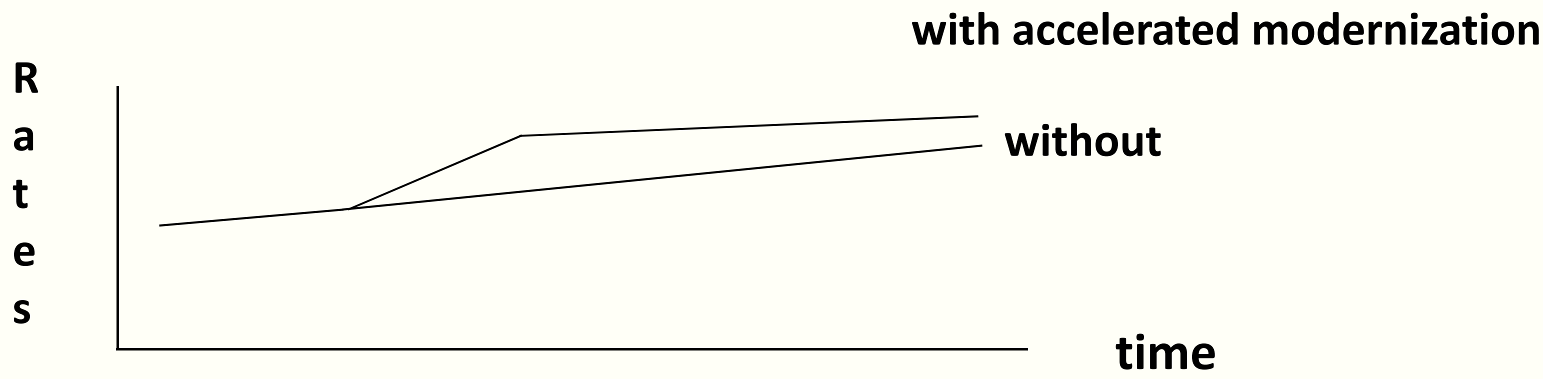
ARM design is key issue in MRP proceedings

4 well-established approaches

- Indexing
- Forecasting
- Hybrid
- Tracker/Freeze

Different approaches make sense for different utilities and regulatory traditions

Rate Escalation Requirements: UDCs



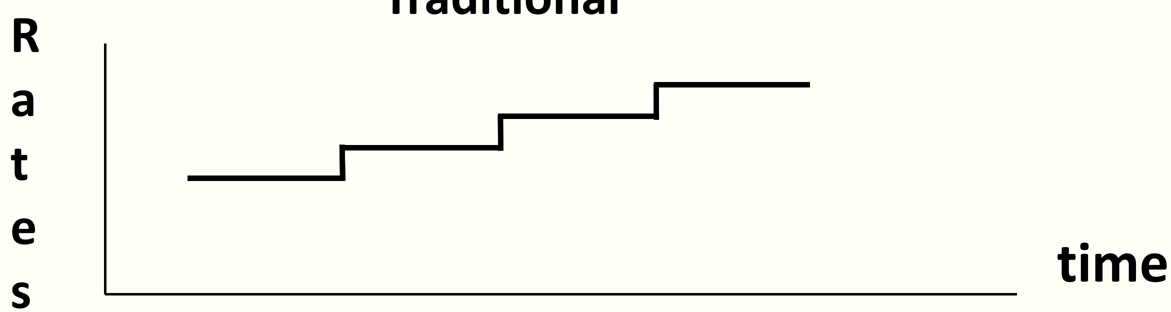
>>> Agreeing on ARMs for rapidly modernizing UDCs can be difficult

This has slowed their adoption in US

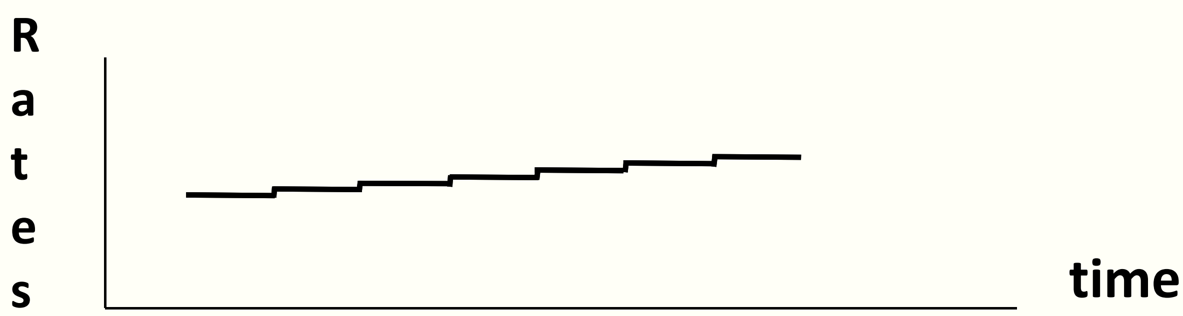
Canadian regulators have faced the challenge

Rate Escalation Requirements: VIEUs

Traditional



Contemporary



>>> Agreeing on ARMs for VIEUs *easier* than in past

Case Study: Central Maine Power

Impetus for MRPs in Maine came from Commission
3 successive plans (here is the last)

Attrition Relief Mechanism:
growth Rates = growth GDPPI – X (X=1%)

Capital Cost Tracker: Automated metering infrastructure

Earning Sharing: Asymmetric sharing of surplus earnings

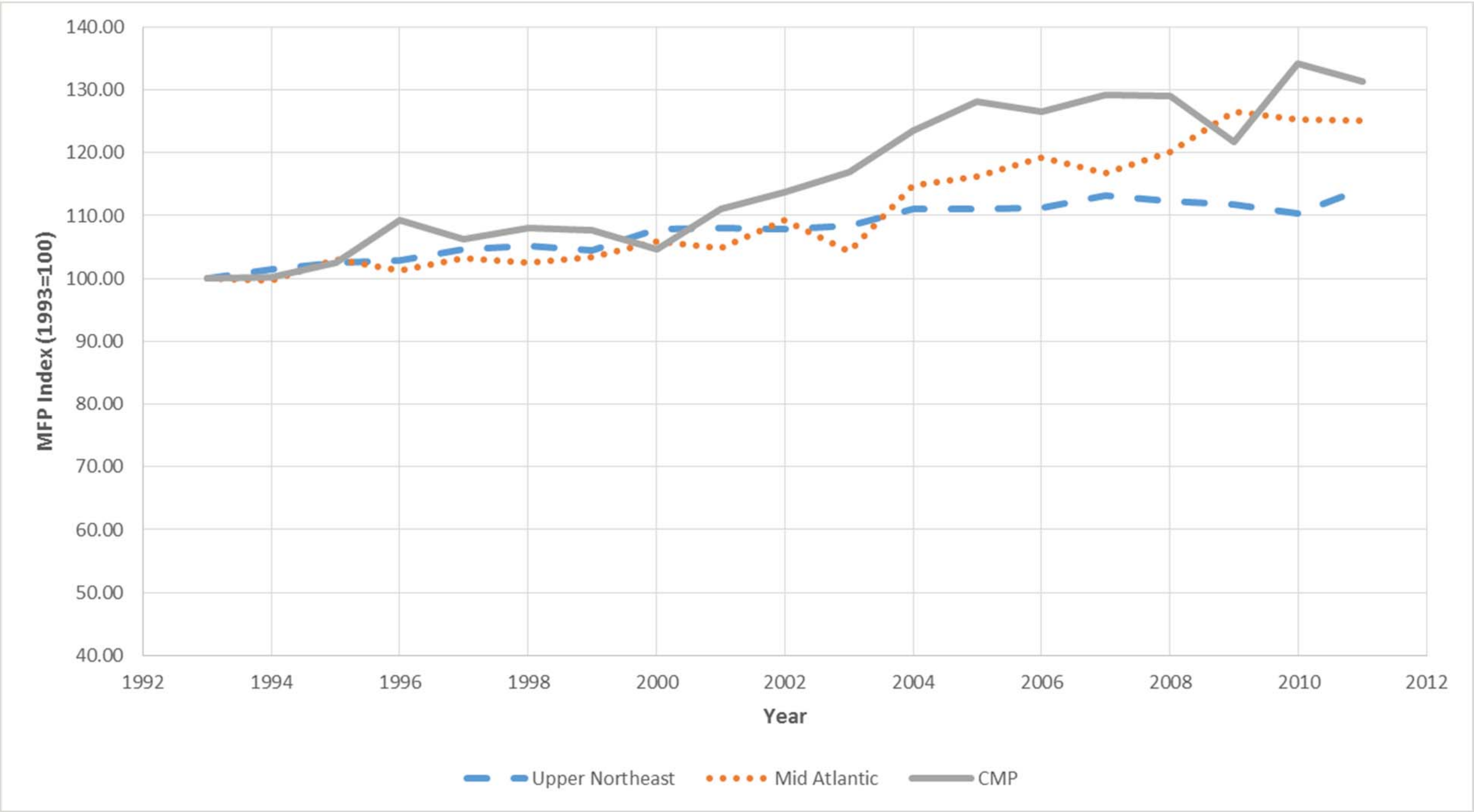
Plan term: 5 years (2009-2013)

Service Quality: Multi-indicator penalty mechanism

Marketing Flexibility: Light-handed regulation of optional targeted rate schedules and rate discounts

Reference: Maine Public Utilities Commission, "ARP 2008 Settlement," June 2008

Distribution Productivity Trends of CMP and Two Northeast Regions



Case Study: Pacific Gas & Electric

Application Base revenue for generation and distribution

Revenue Decoupling

- Decoupling true up plan
- Stairstep RAM w/ Z factor

		2015	2016
Stairstep RAM w/ Z factor	Generation:	1.6%	4.0%
	Distribution:	5.2%	5.2%

Capex Tracker Smart grid pilots

Rate Design Inverted block rates

Plan term 3 years (2014-2016)

Reference: Decision 14-08-032, Application 12-11-009, August 2014

Tracker/Freeze ARM

Rapidly growing costs addressed by tracker

Residual costs addressed by rate freeze

Costs of new generation capacity often tracked

Precedents

- VIEUs: AZ, CO, FL, LA, VA
- UDCs: OH

Case Study: Arizona Public Service

Permitted Base Rate Changes

- Immediate $116.3 million increase in non-fuel rates
- Subsequent base rate increase contingent on acquisition of Four Corners units 4 & 5

Cost Trackers & Deferrals

- Environmental compliance capex
- Transmission cost tracker
- Fuel & purchased power tracker
- Property tax deferral if tax rate changes
- Nuclear decommissioning tracker
- Renewable generation capex
- DSM cost tracker
- LRAM for DSM & DG

Plan term 4 years; rate case moratorium through May 31, 2015

Reference: Arizona Corporation Commission Docket No. E-01345A-11-0224

Incentive Power Research

Incentive Power Model uses numerical analysis to compare cost performances of a hypothetical utility under performance based regulatory systems

Key Results

- Multiyear rate plans can materially improve cost performance
  (e.g. cost 3-10% lower after ten years)
- Benefit greater when Performance Based is frequent rate cases or expansive cost trackers
- Transitional ("baby-step") MRPs do not greatly improve performance
- New approaches to MRP design (e.g. efficiency carryover mechanisms based on statistical benchmarking) can "turbocharge" performance

Utility of the Future: First Glimpse

Regulatory System

- Multiyear rate plan
- Revenue decoupling or LRAM
- PIMs for peak load management and DERs
- Time-sensitive rates
- Integrated resource planning extends to distribution
- VIEUs play sizable role in renewable generation

Conclusions

Vermont regulation should

- Be efficient
- Strengthen performance incentives
- Share benefits with customers
- Encourage efficient peak load management and DGS

A well-designed MRP can encourage these outcomes

Challenges

- Identifying a reasonable cost trajectory
- Ensuring customer benefits
- Embracing new regulatory “technologies”

Appendix

Suggestions for Further Reading

California Public Utilities Commission (2016), *Decision Addressing Competitive Solicitation Framework and Utility Regulatory Incentive Pilot*, R-14-10-003, December. http://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=171555623

Ken Costello, *Multiyear Rate Plans and the Public Interest,* National Regulatory Research Institute, 2016 http://nrri.org/download/nrri-16-08-multiyear-rate-plans/

e21 Initiative (2016), Phase II Report *On implementing a framework for a 21st century electric system in Minnesota,* www.betterenergy.org/e21-PhaseII

Jim Lazar, Frederick Weston, and Wayne Shirley (2011), *Revenue Regulation and Decoupling: A Guide to Theory and Application.* http://www.raponline.org/document/download/id/902

David Littell, and Jessica Shipley, *Performance-Based Regulation Options*, White Paper for the Michigan Public Service Commission, August 2017.

Mark Newton Lowry, Matt Makos, and Gretchen Waschbusch (2015), *Performance Based Regulation for Emerging Utility Challenges: 2015 Update*, published by the Edison Electric Institute. http://www.eei.org/issuesandpolicy/stateregulation/Documents/innovative_regulation_survey.pdf

Suggestions for Further Reading (cont'd)

Mark Newton Lowry and Tim Woolf (2016), *Performance-Based Regulation in a High Distributed Energy Resources Future,* prepared for Lawrence Berkeley National Laboratory. https://emp.lbl.gov/sites/all/files/lbnl-1004130_0.pdf

Mark Newton Lowry, Matt Makos and Kaja Rebane (2016), *Performance Metrics and PBR for US Electric Utilities*, prepared for Edison Electric Institute and a consortium of US electric utilities.

Mark Newton Lowry, Matthew Makos, and Jeff Deason (2017), *State Performance-Based Regulation Using Multiyear Rate Plans for U.S. Electric Utilities,* prepared for Lawrence Berkeley National Laboratory. https://eta.lbl.gov/sites/default/files/publications/multiyear_rate_plan_gmlc_1.4.29_final_report071217.pdf

New York Public Service Commission (2017), *Order Approving Shareholder Incentives*, New York Public Service Commission Case 15-E-0229.

New York Public Service Commission (2017), *Order Extending Brooklyn/Queens Demand Management Program*, New York Public Service Commission Case 14-E-0302.

Melissa Whited, Tim Woolf, and Alice Napoleon, *Utility Performance Incentive Mechanisms, A Handbook for Regulators*, Prepared for the Western Interstate Energy Board, March 9, 2015.

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- Active in PBR field since 1990s
- Specialties: multi-year rate plans, productivity and benchmarking research, revenue decoupling
- Recent clients: Alberta Utilities Consumer Advocate, Association Quebecoise des Consommateurs Industriels d'Electricite, Duke Energy, Green Mountain Power, Ontario Energy Board, U.S. Dept. of Energy, Xcel Energy
- Former Penn State University energy economics professor
- PhD Applied Economics, University of Wisconsin
- Ohio native, Wisconsin resident

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