



NARUC

**The National
Association
of Regulatory
Utility
Commissioners**

Regulating in the Public Interest: An Analysis of the Impacts of Electricity Price Shocks on Public Utility Commissions

**Claire Zheng
ORISE Fellow
U.S. Department of Energy**

**Miles Keogh
NARUC Research Lab**

**Kiera Zitelman
NARUC Research Lab**

October 2017

**With support from the U.S. Department of Energy
Award Number DE-EP0000023**

Acknowledgments and Disclaimers

This report was made possible by the U.S. Department of Energy (DOE) Office of Policy under Award Number DE-EP0000023.

The authors thank Eric Hsieh (DOE) for his guidance and support of this project. The authors also thank Jonah Steinbuck from the DOE Office of Energy Efficiency and Renewable Energy and Jessica Lin from the DOE Office of Policy Analysis, as well as Kerry Worthington, Aida Timm, and André Parraway from NARUC for providing helpful comments and improving the report overall. However, the views and opinions expressed herein are strictly those of the author(s) and may not necessarily agree with positions of NARUC or those of the DOE.

Please direct questions regarding this report to Kiera Zitelman, Senior Program Officer in the NARUC Center for Partnerships & Innovation, formerly known as the Research Lab, at kzitelman@naruc.org or (202) 898-2212.

© October 2017 National Association of Regulatory Utility Commissioners

Disclaimer: This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

EXECUTIVE SUMMARY

The dual trends of utilities' increasing investments in the electric system and decreasing load growth have the potential to put upward pressure on electricity rates. This paper examines whether historic rate changes could illustrate an upper bound for rate changes, and whether those changes resulted in shortened tenures for public utility commissioners. This resulting analysis seeks to obtain insights through analysis of historical data. First, the analysis quantified the magnitudes of rate and bill changes that have occurred since 1990. Second, the analysis identified, both quantitatively and qualitatively, how utility commissioners have responded to or been affected by rate increases.

Quantitatively, the analysis developed a novel definition of large rate increases and two novel metrics for effect on utility commissioners: average commissioner tenure and annual commissioner departures. The analysis used utility-level data between 2000 and 2015 from the U.S. Energy Information Administration to calculate large rate increases. The analysis found that the metrics did not exhibit any statistically significant correlations. In other words, there is no obvious relationship between large rate increases and effect on utility commissioners' tenures or departures.

Qualitatively, NARUC staff conducted interviews with staffers from six commissions that had experienced a period of "crisis" that was not necessarily related to rates. Crisis was defined as a period characterized by three criteria:

- Turnover (commissioners leaving their roles early or abruptly)
- Unusually high gubernatorial and/or legislative contact
- Journalistic scrutiny

NARUC staff selected six states, based on institutional knowledge, which had experienced the three crisis criteria:

1. Massachusetts, 2006 (rate case following rate cap expirations, post-gubernatorial election).
2. Maryland, 2007 (reliability inquiry & rate case) & 2012 (post-derecho reliability case).
3. Florida, 2010 (rate cases for major utilities).
4. Colorado, 2011 (Clean Air, Clean Jobs planning cases).
5. Ohio, 2012 (rate cases for major utilities).
6. Mississippi, 2015 (certification cases for Mississippi Power generating unit).

NARUC staff asked interviewees about the background of crises, the political and public interactions that contributed to or diminished the crises, and the strategies and tools that were helpful or detrimental in weathering crises. The interviews yielded these key findings:

1. Customer dissatisfaction with the utility may be a better predictor of commissioner turnover than rate increases specifically.
2. Rates seem to matter more than bills, with exceptions.
3. Subsets of customers matter: there's no average rate, average bill, or average customer.
4. Well-founded explanations of the need for rate increases may go a long way in managing controversy.
5. Developing targeted communications vis-à-vis impacted communities is effective.

In conclusion, the statistics did not identify an obvious relationship between large rate increases and effects on utility commissioners. The interviews did identify a range of effective, ratepayer-centric strategies that have been useful to past commissioners weathering crises.

INTRODUCTION

Over the last decade, investment by major electric utilities has increased by about \$10 billion in the transmission system and by over \$6 billion in the distribution system.¹ At the same time, the amount of energy delivered over those wires is nearly stagnant, with electricity sales almost flat. These two trends together could logically put upward pressure on rates. The pressure to raise rates for increased investment can also be found in natural gas² and water³ utilities. As described by a ratings agency,

"Highly rated utilities consistently consider the impact of operational and capital programs on rate affordability. While Fitch believes credit is due to those systems that consistently raise rates to preserve financial strength, these activities will be more sustainable when rate affordability is a focus of policymakers and cost containment is regularly employed. Fitch believes that not only should the level of rates for particular customers be considered in these reviews, but also the affordability of rates relative to income."^{4,5}

This paper tests a hypothesis that historic rate changes exhibit an upper bound for rate changes, potentially correlated by examining public utility commissioner tenures. This resulting analysis seeks to obtain insights through analysis of historical data. First, the analysis quantified the magnitudes of rate and bill changes that have occurred in the past. Second, the analysis identified, both quantitatively and qualitatively, how utility commissioners have responded to or been affected by rate increases.

QUANTITATIVE ANALYSIS

In a cost-of-service industry, a regulatory body, usually a group of utility commissioners, must balance the need to sufficiently fund electricity delivery with the need to preserve just and reasonable rates. Sometimes, stakeholders do not agree on the balance a commission strikes, leading to public response. This study started with an attempt to identify when rates may have increased too quickly for ratepayers' tolerance and identify any correlation with repercussions on the decision-makers who approved the increases.

Quantitative analysis of the political science of public utility commissions (PUCs) is limited. Some literature exists, including examinations of consumer satisfaction with utilities,⁶ the relationship between consumer satisfaction and PUC-determined return on equity,⁷ and commissioner relationships with elected politicians.⁸ Mark Jamison, former staffer at the Iowa Utilities Board and present director of the Public Utility Research Center at the University of Florida, presents some anecdotal evidence that

¹ Deloitte, "From Growth to Modernization: The Changing Capital Focus of the US Utility Sector," 2016. <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-er-from-growth-to-modernization.pdf>.

² U.S. Department of Energy, "QER Report: Energy Transmission, Storage, and Distribution Infrastructure," Appendix B: Natural Gas, April 2015. https://energy.gov/sites/prod/files/2015/09/f26/QER_AppendixB_NaturalGas.pdf, p NG-55.

³ American Society of Civil Engineers, "2017 Infrastructure Report Card," 2017. <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-Final.pdf>.

⁴ Fitch Ratings, "Water and Sewer Revenue Bond Rating Guidelines," August 6, 2008.

⁵ Although energy burden is an important issue to consider, it is outside of the scope of this paper and not explored in the analysis.

⁶ University of Missouri-St. Louis, L. Douglas Smith et al, "Assessing Residential Customer Satisfaction for Large Electric Utilities," 2014. <https://www.aeaweb.org/conference/2016/retrieve.php?pdfid=337>.

⁷ JD Power, Federico et al.

⁸ Mark Jamison, "Leadership and the Independent Regulator," 2004. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.562.7538&rep=rep1&type=pdf>.

regulators who are perceived to be "politically active" or responsible for unpopular policies do lose their jobs.⁹ However, in general, the project team did not find recent literature within the last 20 years that quantitatively examined utility rate changes or political response.

The project team quantitatively tested whether there is a relationship between large changes in electricity rates and the tenure of the decision-makers who approve such changes.

METRIC A: CHANGES IN ELECTRICITY EXPENDITURES

Answering the research question required defining multiple new metrics, including the size of a large rate increase and various measures of commissioner tenure.

Payment for electricity can be measured in multiple ways. Some intuitive measures are rate (commonly expressed in dollars per kilowatt-hour) or typical monthly bill (including fixed, volumetric, and any other charges imposed on a typical customer). Other metrics include the total rate base of a utility or revenues collected by a utility.

The measures that seemed most relevant and visible to consumers were rates and bills. The best data available are from Form EIA-861, a dataset that is easy to use and collected consistently. EIA-861 provides annual revenues, electricity volume, and consumer count by utility. The project team calculated average electricity rates and average monthly bills by consumer class (residential, commercial, and industrial). Annual average rates were calculated by dividing revenues by sales. Average monthly bills were calculated by dividing residential revenues by residential customer count¹⁰ and by 12 months in a year.

The limitation from using averages is that rates and bills are actually individual to each customer, but not straightforward to calculate. Many consumers are not on flat rates, but are instead on tiered rates based on total usage or other rate designs with fixed charges. Monthly bills may incorporate charges not calculated directly from actual volume of electricity consumption, such as low-income or energy efficiency support. However, no database currently exists that reports consumer rates and bills disaggregated past the utility level.

Although the project team was aware of experiences where commissioners and consumers judged a rate change to be large, the project team did not find a uniform standard for defining large. One subject matter expert offered as one definition that a large rate change could be an increase of more than triple inflation for three consecutive years.

GENERAL TRENDS

Before defining what a large rate increase might be, the project team explored general rate trends. Rates and bills have seen substantial volatility in the past 25 years. In general, rate and bill changes divide into two periods:

- 1990 to 2000: Rates and bills tend to be steady and decline gradually in real terms.

⁹ Mark Jamison, *Energy Journal Quarterly* 3(3): 17-20, "The Economic and Political Realities of Regulation: Lessons for the Future," 2015.

https://bear.warrington.ufl.edu/centers/purc/docs/papers/1502_Jamison_The%20Economic%20and%20Political%20Realities%20of%20Regulation.pdf.

¹⁰ This assumes customers were counted individually (by household, for residential). However, some residential multi-family homes share one meter, and it is not clear whether these consumers were counted by building or household. This may contribute some error.

- 2000 to 2015: Rates and bills experience volatility and relatively faster growth.

Overall, rates have increased in nominal dollars from about 7 cents in 1990 to about 10 cents in 2015 (Figure 1). In real dollars, rates decreased through 2000, started increasing through 2010, and have since fallen slightly and flat-lined.

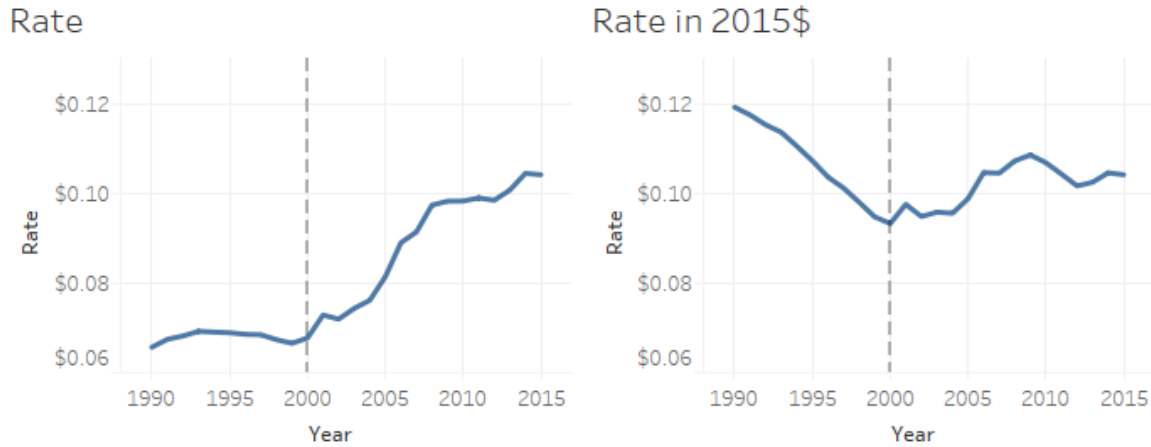


Figure 1: Average rates have generally increased in nominal terms and are lower than in 1990 with some growth since 2000 in real terms to 10.41 ¢/kWh in 2015. The vertical line at 2000 splits the two periods.

From 1990 to 2000, the majority of electricity was sold at rates lower than that of the previous year, reaching a peak of almost 90 percent in 1997 (Figure 2). Beginning in 2000, the proportion of electricity sold at higher rates than that of the previous year sharply increases, peaking at 70 percent in 2009. In more than half of the years between 2000 and 2015, the majority of electricity in the U.S. was sold at higher rates than those of the previous year.

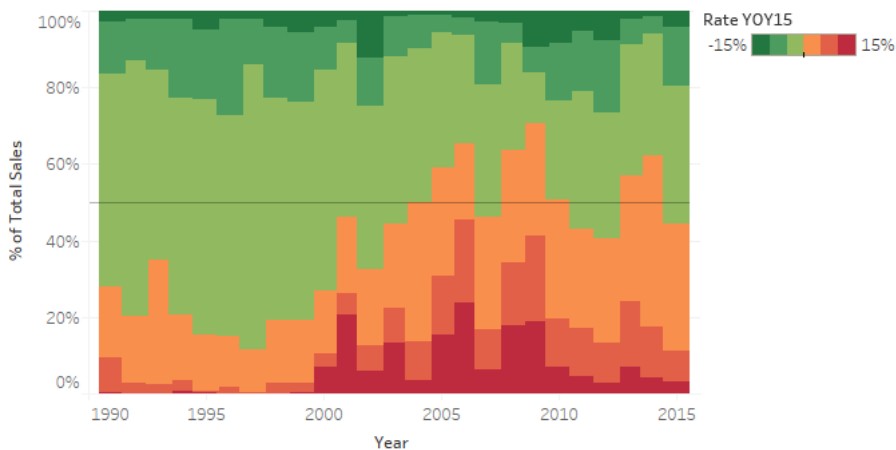


Figure 2: The proportions of electricity sales are shaded by the inflation-adjusted rate change from the previous year. Reductions in rate are in green and increases in red. The shades are in steps of 5%, from 0% to 5%, 5 to 10%, and 10% and above. The 50% line is marked on the vertical axis. The sales described are bundled sales only, excluding energy and delivery only sales (retail marketers).

Although Figure 1 and Figure 2 indicate general trends, Figure 2 also indicates the variety in rate changes across the U.S. Even during years when most utilities saw moderate to sharp increases in rates, other utilities saw moderate and sharp decreases. Figure 2 is one indicator of the diversity of utilities and difficulty in developing broad generalizations.

1. Arbitrary Selection of 15 Percent Year-over-Year

The first approach was to arbitrarily set a cutoff to understand when historically large rate increases generally have occurred. The project team chose 15 percent.¹¹

Using the 15 percent metric, large rate increases seem to be concentrated in the post-deregulation period, especially from 2005 to 2009, coinciding with a period of higher fuel prices. Nearly no large rate increases occurred before 2000 (Figure 3). The years with the higher count of instances were 2001, 2006, and 2009. A sizable proportion of utilities have had a large increase at some point from 1990 to 2015. Of investor-owned utilities (IOUs) with a moderate to large consumer base,¹² 40 percent had year-on-year rate increases over 15 percent from 1990 to 2015 (Table 1). These utilities, spread across 38 states, have had 143 instances of such large rate increases.

Count of IOUs	93	IOU with Most	DPL (5)
Count of States	38	State with Most	MA (17)
Count of Instances	143	Year with Most	2001 (19)

Table 1: Summary counts from 15% year-on-year rate changes (adjusted for inflation).

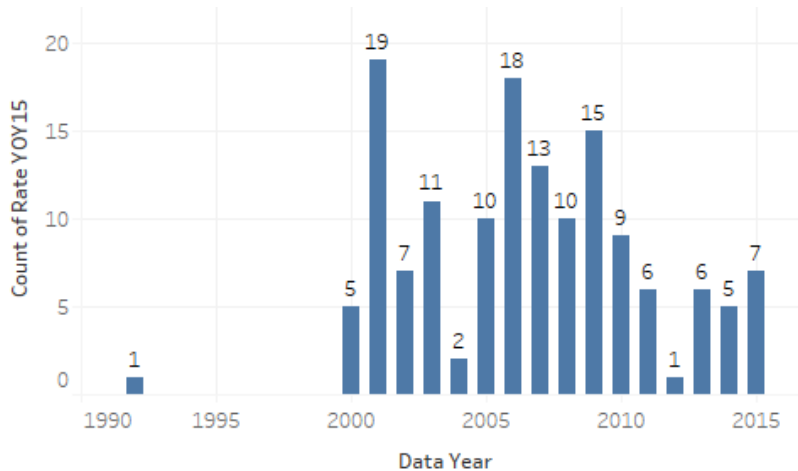


Figure 3: Count of instances of year-on-year rate increases above 15%.

Using the 15 percent metric provides some insight into the history of large rate increases. However, 15 percent was chosen arbitrarily, and the project team needed a more rigorous and systematic choice for defining "large."

2. One Standard Deviation above Mean Rate Change

The second approach examined the entire population of year-on-year rate changes from 1990 to 2015 for all U.S. utilities (Figure 4). Almost 90 percent of all changes, adjusted for inflation, fell between -10 to

¹¹ The project team chose 15 percent as "large rate increases" to provide a quantitative basis for the analysis.

¹² There were many small utilities that had extreme changes. The project team filtered the utilities to investor-owned utilities with a customer count of at least 10,000. Each IOU is counted by state as well. In other words, if an IOU serves two states, it is considered a separate company for each state. There are a total of 233 such IOUs.

+10 percent. Without outliers,¹³ the mean was -0.2 percent and one standard deviation above was +8.9 percent.

Histogram Rate, Bundled, Total

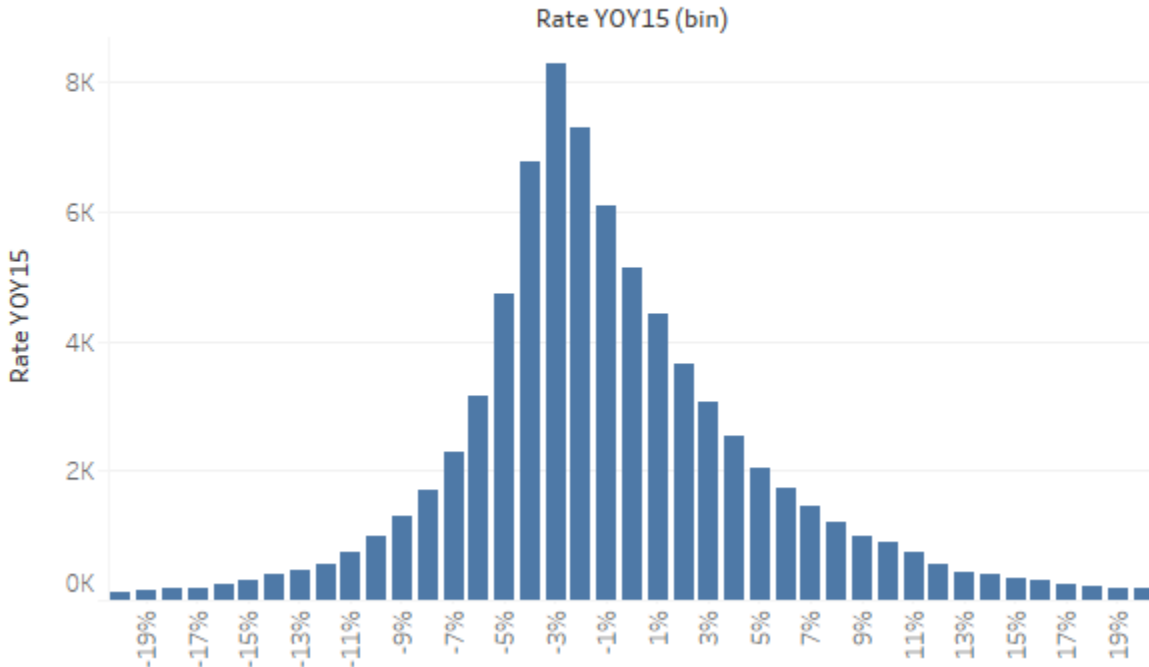


Figure 4: Histogram of year-on-year inflation-adjusted rate changes averaged at the utility level from 1990 to 2015 for all U.S. utilities providing bundled (not delivery- or energy-only) service. Histogram is cut off for space from -20% to +20%, only 3.5% of year-on-year rate changes are outside those bounds.

Mean	-0.20%	Mean + Stdev
Standard Deviation	9.09%	8.88%
Median	-1.20%	

Table 2: Statistics from all year-on-year rate changes histogram.

Under this definition, a large rate increase would be 8.9 percent or more. However, the project team determined that 8.9 percent seemed potentially too high for some states and too low for others. The project team then considered that a singular number may overgeneralize and assume that one population's perception of large is equivalent to another's.

3. One Standard Deviation above Mean Rate Change by Utility

The final approach was to apply the previous metric on a state-by-state level.¹⁴ The project team considered that each state may have its own experience and therefore understanding of what constitutes a large rate increase. Therefore, the project team examined the year-on-year changes for the largest IOU by

¹³ About 0.1 percent of rate changes were outliers that were above 100 percent, but some were large enough to significantly skew standard deviation and mean. All values above 100 percent were therefore removed.

¹⁴ The team recognizes that selecting specific thresholds a priori (such as one standard deviation above the mean) may lead to sub-optimal correlations. Instead, one could run the correlation analysis for all possible threshold choices and identify the thresholds that yield the largest significant correlations (if any).

state.¹⁵ The project team chose the largest IOU by load because the largest IOU would be the most sizable constituency of consumers served by a PUC¹⁶ and, therefore, may have the largest political repercussions.

Large rate changes were defined as larger than one standard deviation above the mean for each of the largest IOUs per state. To smooth out some of the extreme shocks and account for the stepped nature of rate increases, the project team used three-year rolling averages.

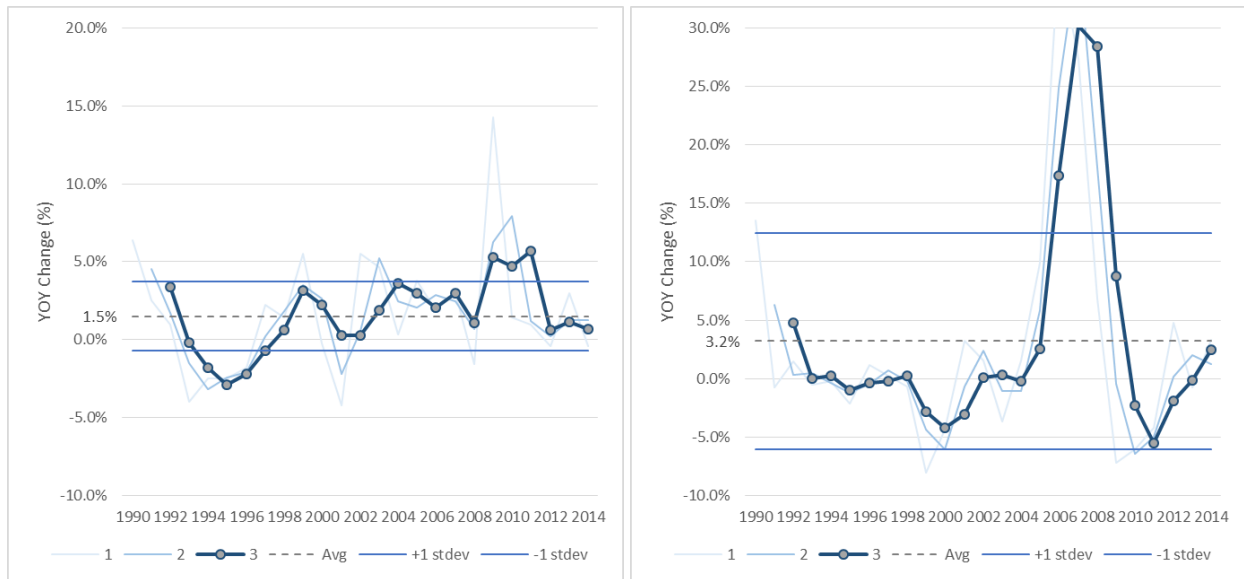


Figure 5: The change curves and ranges for the largest IOUs of two different states are distinctly different. The graphs show year-on-year change rolling change for one, two, and three years (marked in the darkest) as well as mean and one standard deviation above and below. Large rate changes would be any data points above the upper blue horizontal line.

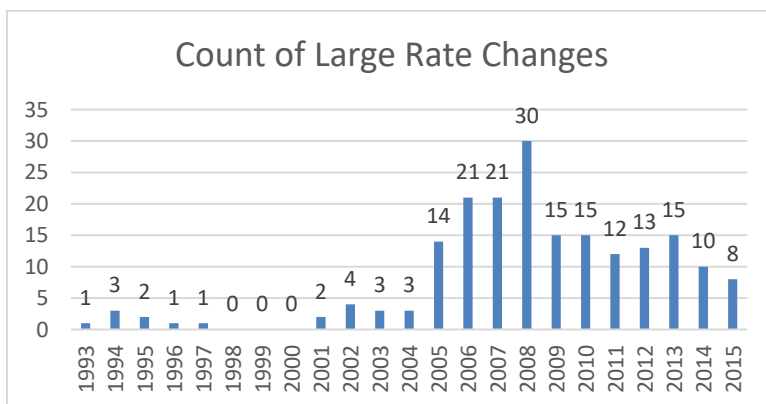


Figure 6: Count of all large rate changes per state-largest IOU.

Notes on Data for Metric A: Changes in Electricity Expenditures

The project team chose to use the third approach for defining a large rate increase after proceeding through the considerations discussed. However, some caveats remain. One is that a "large" rate increase is being defined in a past year by data that will happen in the future, since the project team is using the

¹⁵ As the data would allow for inclusion of more than one of the utilities serving each state, future analysis might consider aggregating data across utilities within each state for a more comprehensive view of rates.

¹⁶ Texas and Nebraska were excluded. Nebraska has no IOUs, and Texas retail sales are all deregulated.

average for the entire time period from 1990 to 2015. In other words, the project team is using data from 2015 to define what a large rate was in 1990, even though 2015 hadn't happened yet. In general, there is the larger question of whether "large" should be defined by perception or an absolute figure. A future enhancement may be to define a time length of consumer memory and use a rolling average of that time length.

Another note is that the analysis only includes residential consumers and excludes monthly bills. Comparability is more difficult for industrial and commercial consumers within states; in other words, one industrial consumer is not necessarily the same as another within utility territories. Examining industrial and commercial data would have required more case-by-case detail. As for bills, the analysis initially examined monthly bills. However, the data indicated that rates and bills are generally correlated (Figure 7), so the calculations were only performed for rates.

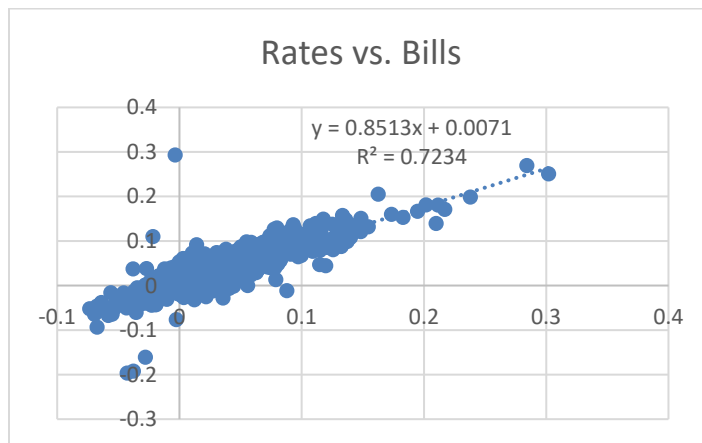


Figure 7: Average rate increases (x-axis) plotted against average monthly bill increases (y-axis) for residential consumers for the largest IOU in each state from 1990 to 2015. The R-square of 72% suggests a strong correlation.

METRIC B: DECISION MAKER REPERCUSSIONS

"Repercussion" is a broad term. This study uses commissioner tenure as a quantitative proxy for repercussions. The project team explored whether there were changes in commissioner tenure, or some similar metric, that could be observed and correlated with large rate changes. The project team primarily used Michigan State University's Institute of Public Utilities' Database on All Commissioners¹⁷ and NARUC's annual yearbooks, supplemented by SNL Regulatory Research Associates news and reports and public utility commission websites.

Commissioner tenure in years was calculated by the length of time between the end and start dates given in the IPU database. Commissioner departures were calculated by the net count of commissioners by end year.

GENERAL TRENDS

A total of 1,070 commissioners have served some or all of their terms between 1990 to present, and 203 of those commissioners are currently still serving. When examining all commissioners, including those currently in office, average tenure served appears to trend down. For all commissioners serving at any time between 1990 and present, the average tenure of the commissioner pool also tends to trend down (Figure 8). This trend appears particularly pronounced for elected commissioners, at a rate of almost a

¹⁷ The database is available at <http://ipu.msu.edu/research>.

half-year drop in average commissioner tenure per year. Since a new commissioner has not yet had a chance to serve one or more terms, examination of tenures in this manner could exacerbate any downward trend.

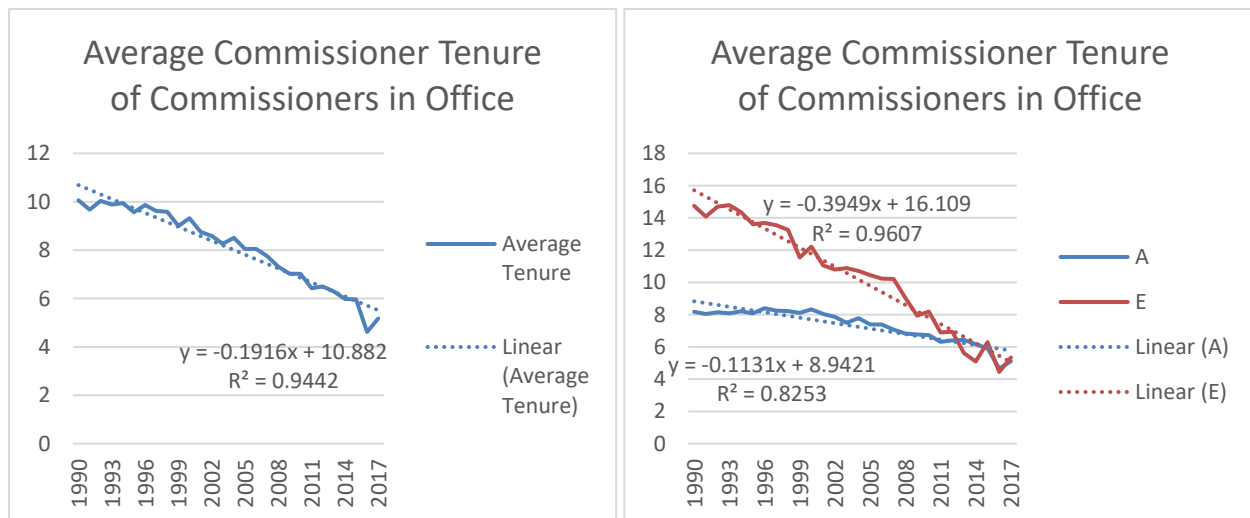


Figure 8: Average commissioner tenure for all commissioners serving at some point in time. For instance, if a commissioner served from 2001 to 2005, the commissioner's tenure of 4 years would be aggregated into the average for each year from 2001 to 2005. This excludes all commissioners currently serving. (A=Appointed; E=Elected)

Examination of tenure trends by departure date suggests a more stable albeit still slightly negative trend. Figure 9 plots the tenure lengths for all commissioners that left office between 1990 and June 2017. By counting the lengths of tenure of only the commissioners who have departed, the potential bias effect of current office holders should be minimized. Under this method, the negative trend in tenure lengths is not as severe. Elected commissioners completing their terms in 1990 had an average tenure of 10.7 years, versus 7.6 years for those leaving in 2017. Appointed commissioners completing their terms in 1990 had an average tenure of 6.3 years, versus 5.9 years for those leaving in 2017.

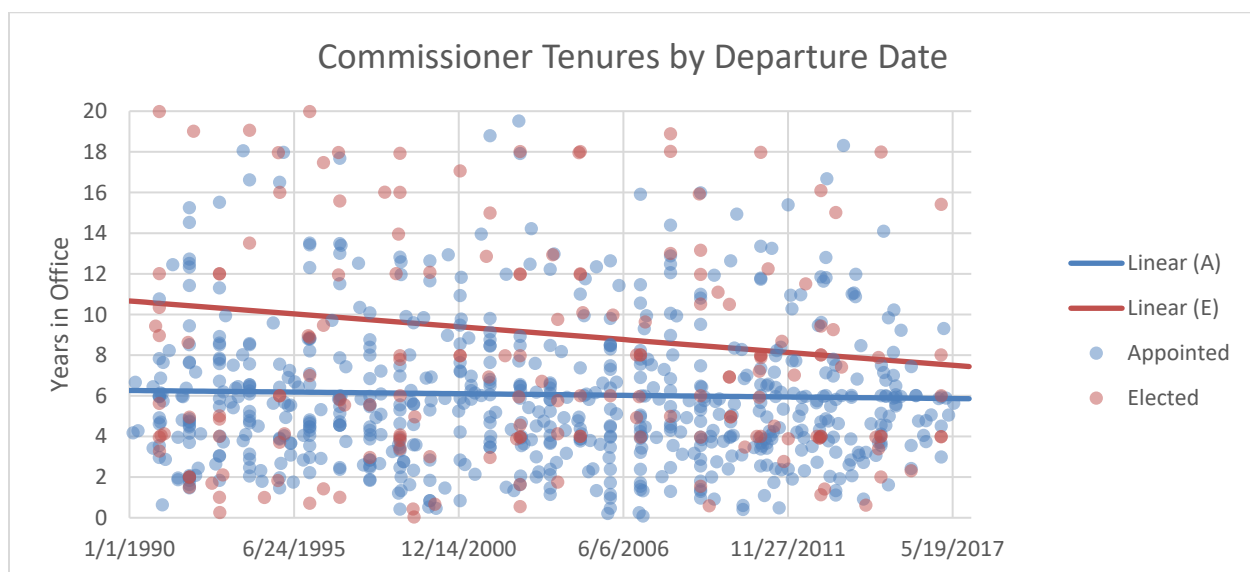


Figure 9: Tenures for all commissioners by date of departure, which excludes any commissioners still in office. (A=Appointed; E=Elected)

Terms of appointment range from 4 to 6 years. The project team considered using terms served as a metric to adjust for varying term lengths across states. However, the project team was not able to calculate terms served for reasons that will be elucidated later.

With the exception of three states,¹⁸ commissions have either three or five members. Commission sizes have generally remained constant; NARUC found only five states with legislative changes to the number of commissioners from 2000 to 2015. There is no clear trend of commissioner departures per year, suggesting a steady flow of commissioners in and out of service.¹⁹

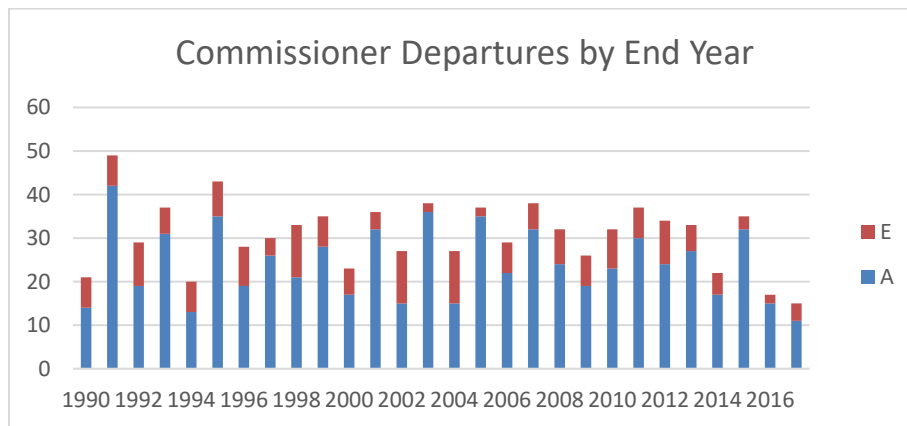


Figure 10: Commissioner departures summed per year for all states. (A=Appointed; E=Elected)

1. Average Commissioner Tenure

The project team examined average commissioner tenure for the group of serving commissioners per state for each year from 1990 to 2015. If a large rate increase led to commissioners being fired or not reappointed or reelected, it may show as shorter terms for all commissioners serving during the period of a large rate increase event. Figure 11 is an example of this comparison.

¹⁸ North Carolina and South Carolina have seven commissioners, and Tennessee had four commissioners from 2003 to 2011.

¹⁹ The downward trend in 2016 and 2017 is due to the exclusion of currently serving commissioners.

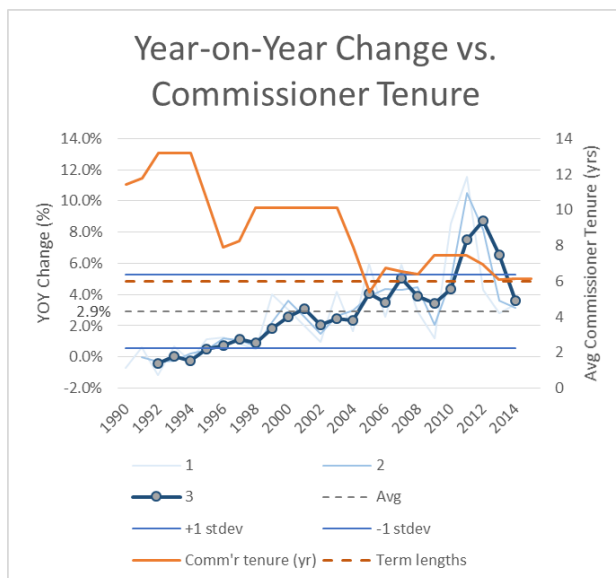


Figure 11: Example of average commissioner tenure compared with year-on-year rate changes.

The project team approached this in two ways. The first way was to calculate average commissioner tenure each year and define an "adverse event" as a drop in average tenure of two years or more. The project team also used the previously provided definition of a large rate increase. Each state-year was tagged for whether a large rate increase had occurred (1 if so, 0 if not) and whether an adverse tenure event had occurred (1 if so, 0 if not).

Testing this relationship produced a probability value of 0.36 (Table 3), or a non-significant probability, indicating no significant relationship.²⁰

		Rate		
		Normal	Extreme	
Tenure Change	Normal	811	167	Chi-sq: 0.361905259
	Extreme	47	13	

Table 3: Chi-square table comparing large rate changes with adverse tenure events. The Chi-square was 0.36, indicating no significant relationship ($p > 0.05$).

The second way was to count by commissioner, tag each by whether a large rate increase had occurred during the commissioner's tenure (1 if so, 0 if not). Comparing the populations of tenures of commissioners who had overseen a large rate increase versus not yielded a probability value of 0.76 (Table 4), again indicating no significant relationship.

None Mean	6.667822
Large Increase Mean	6.769642
t-test	0.759381

Table 4: T-test comparing the tenures of commissioners who oversaw large rate increases versus not. The t-test probability value was 0.76, indicating no significant relationship ($p > 0.05$).

²⁰ The team recognizes that this analysis could allow for time lags, as the political impacts may occur sometime after an "adverse event." Future analysis could use a lag correlation or similar analytical approach to examine this further.

2. Commissioners Departing

The project team examined the count of commissioners departing in each state-year. In a year with a large rate increase, the number of commissioners who leave that year may be higher than normal if there is a political response (comparison shown in Figure 12). An advantage of the departure count metric is its relative simplicity. A commissioner can only depart or not depart; the metric does not require contextualization. Again, the project team approached this metric two ways.

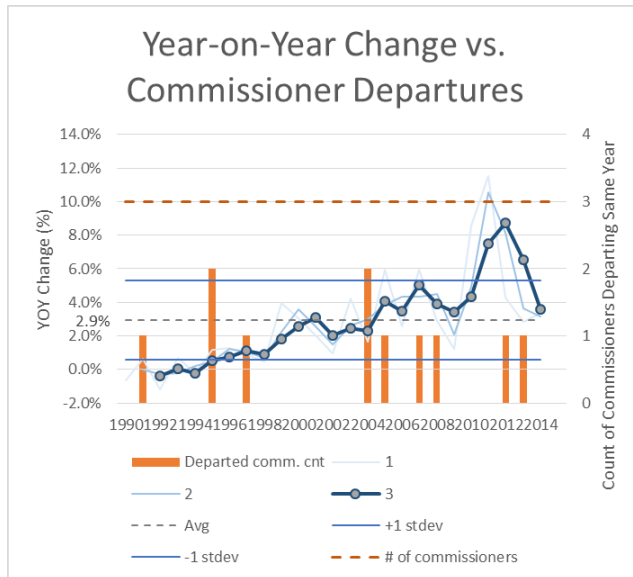


Figure 12: Example of commissioner departures compared with year-on-year rate changes.

The first way was to define an adverse departure event as the departure of more than half the commission. The loss of quorum could be a notable mark of political response to the commission. Each year was tagged by whether more than half the commission left (1 if so, 0 if not) and whether a large rate increase occurred (same as above).

Testing this relationship produced a probability value of 0.75, indicating no significant relationship (Table 5).

		Rate		
		Normal	Extreme	
Departure Def 1	Normal	865	180	Chi-sq: 0.749948
	Extreme	61	14	

Table 5: Chi-square table of the first measure of adverse departure event compared with large rate increases. The Chi-square was 0.75, indicating no significant relationship ($p > 0.05$).

The second way was to define an adverse departure event as a departure of an above-average count of commissioners based on the average from 1990 to 2015.²¹ It was possible that loss of quorum was too

²¹ The team recognizes that it may be more informative to use the "% of commissioners departed in each state-year" as the variable (rather than setting arbitrary thresholds such as "above average" or "more than half the commission"). In future analysis "% of commissioners departed" could then be lag correlated with the variables for rates (e.g., the magnitude of the rates and the change in rates computed over 1-, 2-, and 3-year periods).

strict a measure of adverse nature. Testing this relationship produced a probability value of 0.35, also indicating no significant relationship (Table 6).

		Rate		
		Normal	Extreme	
Departure Def 2	Normal	540	106	Chi-sq: 0.346022303
	Extreme	386	88	

Table 6: Chi-square table of the second measure of adverse departure event compared with large rate increases. The Chi-square was 0.35, indicating no significant relationship ($p>0.05$).

3. Terms Served, Unserved Term

The number of terms served or the remainder of the term left unserved due to an early dismissal or resignation would equalize the difference in term lengths between commissions. NARUC's yearbooks recorded standard term lengths for all commissions from 2000 to present; the project team assumed the term length pre-2000 was the same as 2000. Dividing tenure (years) by number of years per term would theoretically provide terms served.

However, the standard length of term was the exception, not the rule. Based on a preliminary case-by-case review of commissioner terms, the primary reason for non-standard term lengths was the appointment of commissioners to unexpired terms. Unexpired terms exist due to previous commissioners' departures, and the practice of appointing a new commissioner to an unexpired versus new term differs by state. Commissioners may also serve beyond their terms' expiration while waiting for a new commissioner's appointment. Or, commissions commonly operate with a vacancy for a brief period while a new commissioner is identified and assumes duties.

Data accuracy would require individual verification of all 1,070 commissioners to find the original term durations. Commission websites rarely provide this data. The only data source the project team was able to find was manual searching by commissioner in industry news (SNL Research Regulatory Associates) or local newspapers. Commissioners who served and departed pre-2000 were essentially impossible to research on the Internet.

NOTES ON DATA FOR METRIC B: DECISION MAKER REPERCUSSIONS

The qualitative insights from interviews with former commissioners suggested there were methods by which commissioners could ameliorate negative political responses to large rate increases. Thus, the lack of a significant relationship could be partially explained by commissioners' use of tools to ameliorate political response.

Additionally, the study did not distinguish between deliberate and externally caused rate increases or if the distinction matters to constituents of the commission. A majority of large rate increases identified occurred between 2005 and 2009 during high natural gas prices, which would pass through automatic fuel adjustment clauses. These increases may be perceived differently than rate cases. Future studies might classify reasons for rate change, which may require a rate increase metric based on rate base.

Another point to note is that commissions may regulate multiple industries besides electricity, such as water and telecommunications. Although similar in that they are regulated commodity utilities, they may have different response outcomes and repercussions relating to rates and other factors that can induce a crisis at a commission. This may be a topic for future exploration.

FRAMING THE QUESTION

Two metrics related to the nature of a commissioner's term showed no significant relationship with large rate increases. The project team drew the conclusion that there does not seem to be an obvious relationship nationwide. The conclusions may change if the study examined large rate increases on a case-by-case basis using more nuanced metrics. In general, however, this study does not show that there is necessarily a response related to commissioner term when consumers see large rate increases.

The chain between consumer impact and commissioner impact is long and complex. Future work could examine each of these links individually, including the link between rate changes and consumer awareness, consumer awareness and public utility commission engagement, consumer awareness and state politician engagement, and public utility commissions and state legislatures.

The project team attempted to develop a methodology that would simplify case-by-case analysis and identify easily measurable metrics that could be collected and calculated quickly. Clearly, the individual nature of states and commissioners makes this difficult. Future work may continue to search for other generalizable metrics.

Future studies may additionally consider other measures of large rate increases and responses to rate increases. Rate base increases or estimated consumer rate and bill increases, as are sometimes reported in rate dockets, may be another metric. Other metrics of response to rate increases include public sentiment, public opinion surveys, local news coverage, and polls and election results for elected commissioners.

QUALITATIVE ANALYSIS

NARUC staff conducted six interviews in March and April 2017 with current or former utility commissioners or commission staff in six states. NARUC staff introduced the interviews by explaining the research question: Do major rate/bill increases lead commissioners to lose their jobs, and if so, what other circumstances affect the likelihood of commissioner turnover?

NARUC staff identified commissions that had gone through institutional crises and interviewed with commissioners and commission staff who had served during the crisis. "Crisis" was defined as a period of time characterized by three criteria:

- Turnover: commissioners leaving their roles early or abruptly
- Unusually high gubernatorial and/or legislative contact
- Journalistic scrutiny

Each conversation touched on the eight themes below:

1. What was the reason for the rate increase and over what period of time did it occur?
2. What was the public perception of the commission, utility, and/or reason for the rate increase?
3. How was the change communicated to the public?
4. Were bill or rate increases more important?
5. Were there other high-profile infrastructure successes or failures that could have been attributable to the commission around the time of the rate increase?
6. Is the commission independently elected? Who is the commission accountable to?
7. Was there a party identification split between the legislature and governor? How politicized was the commission?
8. Do you have a sense of any other circumstances around the rate case that influenced the public's opinion of the commission?

The framing and questions changed slightly as staff progressed through the interviews and began to reject preliminary hypotheses and form new ideas. NARUC staff began the interviews with a strong sense that party identification would have a substantial impact on commission turnover. During the first several interviews, all interviewees asserted that party identification had little to no impact on their work or the commission as a whole. Subsequently, NARUC staff tended not to ask that question unless interviewees alluded to party identification. NARUC staff typically mentioned staff's evolving thoughts on party identification in the introduction to the interview. Additionally, since several interviewees mentioned consumer advocates, NARUC staff began to ask explicitly about the role of consumer advocates in rate cases if interviewees did not bring it up independently.

INTERVIEWS

Six instances of significant rate/bill increases in six different states were selected (**Error! Reference source not found.**). These cases all occurred between 2006 and 2016. However, pinpointing an exact date for a rate/bill increase is difficult, as rate cases often take years to originate and implement. Thus, dates are approximate. NARUC staff selected relatively recent cases to facilitate obtaining interviews with current or recent commissioners/commission staff. The states represent geographic and political diversity.

State/Year		Turnover?	Large Rate Increase?	Turnover Attributed to Rate Increase?	Appointed or Elected?	Other Issues?
MA/2006		Yes (reorganization)	Yes	No	Appointed	Customer dissatisfaction, governor focus on renewable energy siting
MD	2007	Yes (legislature voted to disband)	Yes	Yes	Appointed	Rate cap expiration
	2012	No	No	No		Reliability issues
FL/2009		Yes (delayed turnover)	No	Yes (proposed)	Appointed	Commission infighting, political election
CO/2011		Yes	No (not in IOUs)	Yes (proposed)	Appointed	Clean energy legislation
OH/2012		No	Yes	No (no turnover)	Appointed	Affected subset of ratepayers
MS/2015		No	Yes	No (no turnover)	Elected	Carbon capture project

Table 7: Case studies examined in this report.

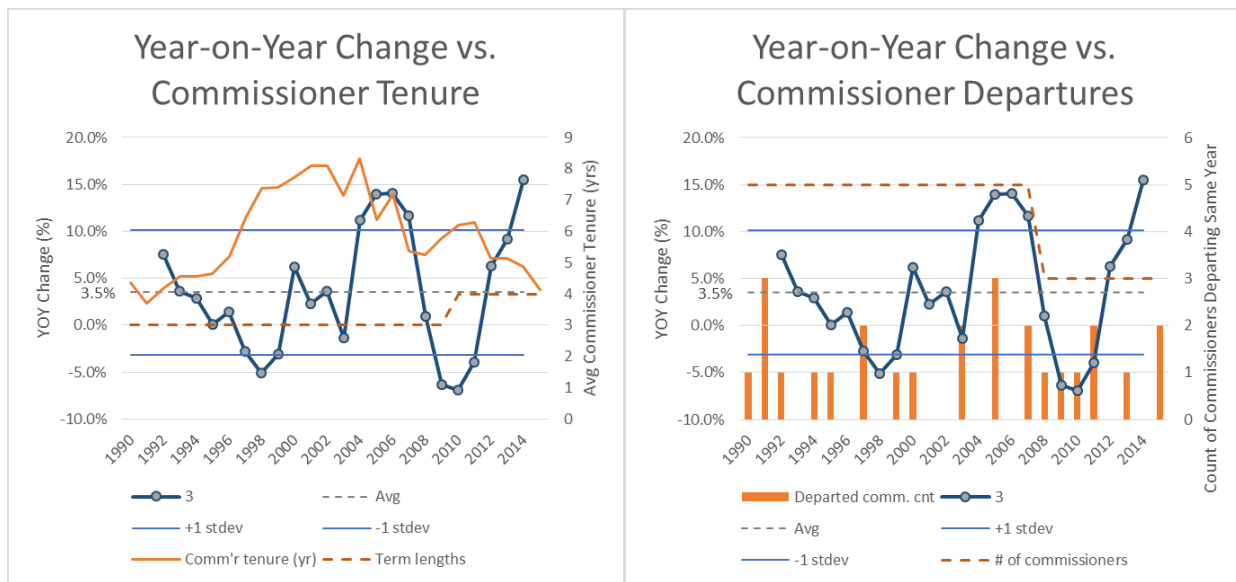


Figure 13: Retail rate change metrics and commissioner tenures for Massachusetts.

After rate cap expirations and substantial investments in electrical infrastructure, the commission was reorganized from the Department of Telecommunications and Energy into the Department of Public Utilities. The DTE had five commissioners appointed to three-year terms; the DPU had three commissioners appointed to four-year terms. Additionally, DTE commissioners were appointed by the governor, and DPU commissioners would be appointed by the secretary of the Massachusetts Department of Energy and Environmental Affairs. The stated aim of the changes was to bring the commission into better alignment with the governor's policy goals, particularly as climate change became an increasingly important focus for the state. Governor Deval Patrick envisioned Massachusetts as a leader for energy efficiency and renewable energy, pushing the commission to encourage onshore and offshore wind in particular. As ratepayers were asked to pay more to replace aging infrastructure with climate-friendly resources, the commission found itself increasingly politicized and visible to the public. There was significant commissioner turnover, with only one of the five DTE commissioners becoming a member of the three-member DPU Commission.

During the interviews, the officials NARUC staff spoke to said that rates and bills were not determinative in the change, and that other factors played a larger role, such as general customer dissatisfaction with how utilities were being regulated and a disconnect in communications about the need for rate increases. However, coincident with this change, Massachusetts ratepayers saw rate increases of between 23 and 27 percent during 2006. As indicated in Figure 13, a downturn in commissioner tenure despite a one-year increase in commissioner term length followed this rate increase, suggesting that substantial rate and bill increases may have been a significant factor in the declining tenure.

²² Graphs reflect rates for Massachusetts Electric Company.

Maryland, 2007 & 2012²³

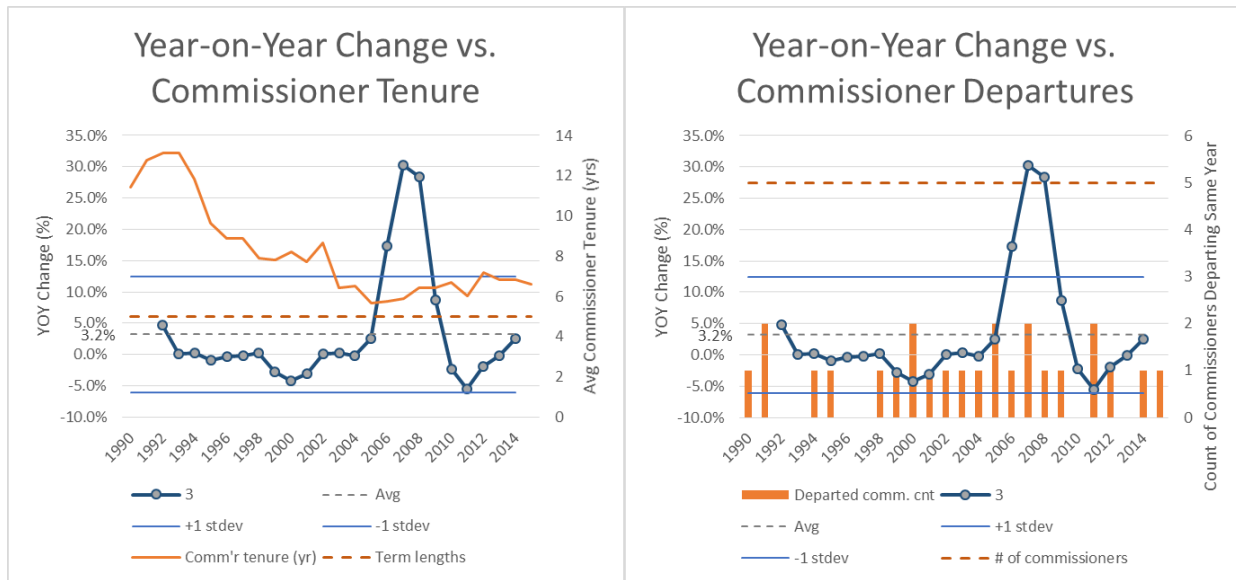


Figure 14: Retail rate change metrics and commissioner tenures for Maryland.

Maryland's rate caps expired in 2007, resulting in rate increases for ratepayers. Some Maryland ratepayers saw back-to-back yearly bill increases as high as 32 and 23 percent in the two years after rate caps were removed. Residential Pepco customers went from paying an average of \$1200 annually in 2006 to nearly \$1700 in 2007. Similar increases occurred for Delmarva Power, Baltimore Gas and Electric, and Allegheny Power as caps expired in those service territories. The Public Service Commission was restructured and rebuilt in the wake of these increases. Only one commissioner was kept on, the rest were replaced. No further rate increases were approved during the period reviewed (to 2015).

Reliability challenges followed as ratepayers grew increasingly dissatisfied with utility performance and questioned why they seemed to be paying higher rates for worse service. In June 2012, an intense derecho (series of high winds and severe thunderstorms) hit the state and left more than one million residents of Maryland, Virginia, and Washington, DC without power for extended periods of time. After the storm, ratepayers were disappointed with the amount of time it took to restore power to some areas and were outraged when Maryland utilities filed additional rate cases to recover the costs of reliability upgrades. This case shows the impact of a dissatisfied ratepayer community. However, in this case, regulators focused their investigations on specifically affected communities and performed outreach in these areas and although there was increased contact from the governor and media scrutiny, no commissioner turnover occurred. Only minor rate increases were approved during this period.

²³ Graphs reflect rates for Baltimore Gas & Electric.

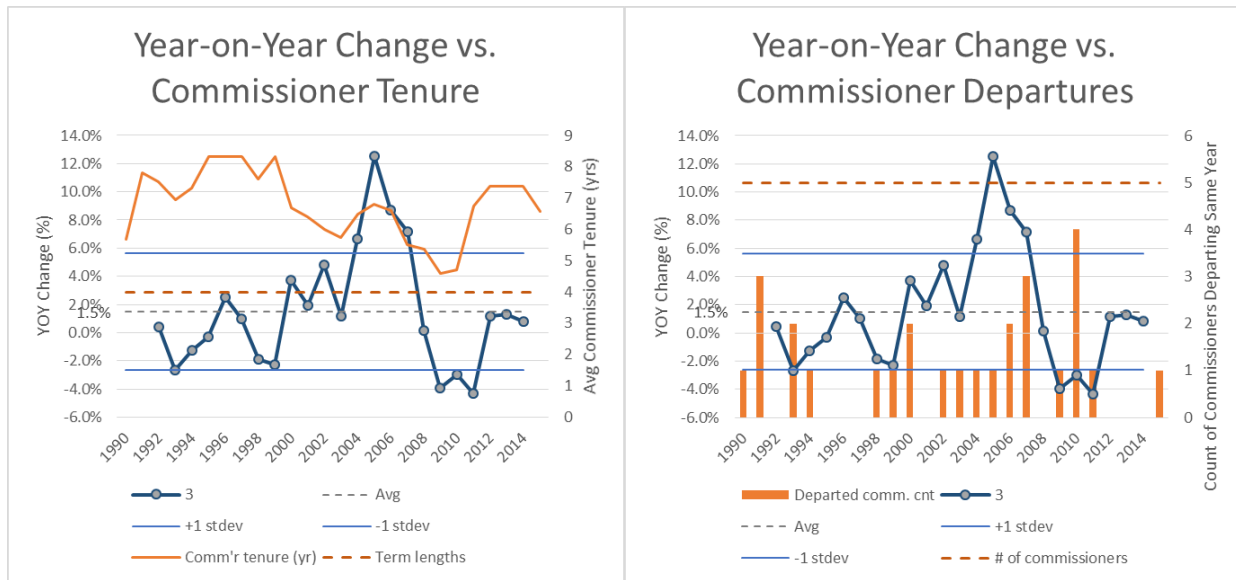


Figure 15: Retail rate change metrics and commissioner tenures for Florida.

The need to recover increasing operating costs and earn a fair return on investment brought the commission a series of rate cases from three investor-owned utilities between summer 2008 and spring 2009. According to the former regulator interviewed, the commission during this era and throughout 2010 experienced high levels of media curiosity, public records requests, internal discord, and eroding public trust. Then-Governor Charlie Crist, who launched a bid for U.S. Senate in 2009, made public statements about his views on electric rate requests and the commission. It was unusual for governors to engage on specific commission issues. Ultimately, he chose not to reappoint two commissioners in late 2009, stating it was "time to clean house."²⁵ Over the next year, following decisions in the two remaining electric rate cases, the two newly appointed commissioners were not confirmed by the Senate and two other commissioners appointed by Governor Crist in 2007 were not approved by the nominating council and thus blocked from potential reappointment. Although the exact reasons for these actions are unclear, the introduction of political input into otherwise routine rate cases changes the environment. Additionally, heightened media and public scrutiny and lack of commission collegiality appeared to play an outsized role in this rapid commission turnover.

²⁴ Graphs reflect rates for Florida Power & Light.

²⁵ Mary Ellen Klas, *Miami Herald*, "Investment Advisors Warn of PSC's 'Politicized Atmosphere,'" Oct. 7, 2009. <http://miamiherald.typepad.com/nakedpolitics/2009/10/investment-advisors-warn-of-pscs-politicized-atmosphere.html>.

Colorado, 2011²⁶

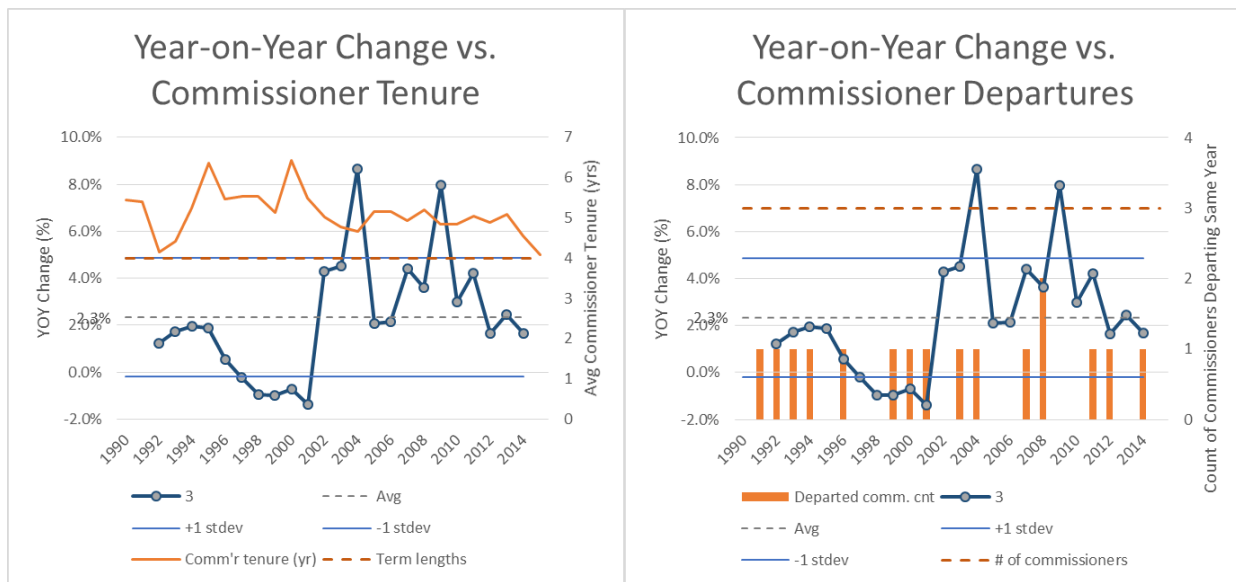


Figure 16: Retail rate change metrics and commissioner tenures for Colorado.

Amidst a national wave of support for policies to address climate change, Colorado passed the Clean Air Clean Jobs Act in spring 2010. The law gave the Public Utilities Commission broad authority to develop a plan to cut greenhouse gas emissions from electricity generation and to approve interim and final rate increases to achieve the specified emission reduction outcomes. The PUC approved a plan for Xcel Energy to retire more than 700 MW of coal-fired generation, build a new 569-MW natural gas plant, switch an existing coal unit to natural gas, and install additional emissions controls on 951 MW of coal-fired generation. The cost totaled approximately \$1 billion. The PUC began implementing the Clean Air Clean Jobs Act during Congress's effort to pass a national cap-and-trade program for carbon dioxide emissions. Although this attempt failed at the federal level, Colorado's state policy moved forward, resulting in national attention toward the costs and benefits of the Clean Air Clean Jobs policy. Although media attention was high, the governor and legislature allowed the PUC process to play out without intervention. During the period in question, the Intermountain Rural Electric Cooperative and the City of Colorado Springs both saw rate increases over 15 percent from the previous year; however, these were not subject to regulatory approval by the state commission. After the proceedings concluded, two of three commissioners left the commission and other turnover occurred among staff.

²⁶ Graphs reflect rates for Public Service Company of Colorado, a subsidiary of Xcel Energy Inc.

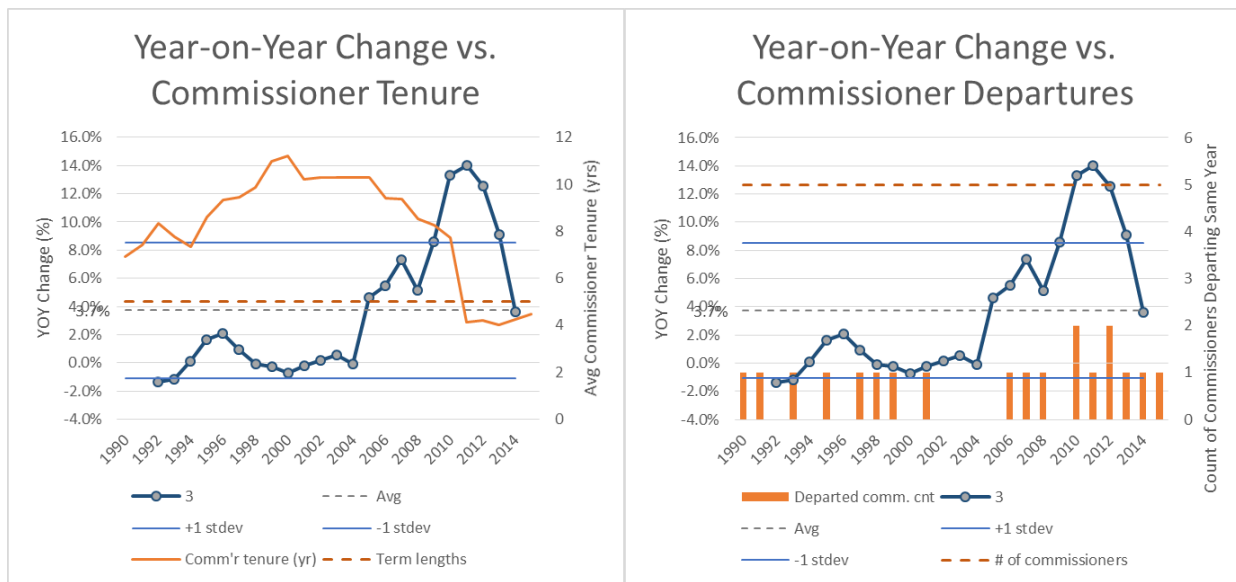


Figure 17: Retail rate change metrics and commissioner tenures for Ohio.

Several utilities filed for commission approval for rate increases in 2012 and the perception was that a long-term decline in volumetric electricity sales was the main cause of this rate increase. Years of strong energy efficiency programs and the slow economic recovery from the 2008 recession drove sales down and created challenging conditions for Ohio utilities. Duke Energy Ohio requested a 24 percent increase in distribution rates; the Public Utilities Commission of Ohio issued an order that would raise average residential bills by approximately 3.3 percent. However, a small subset of residential ratepayers using electricity to heat aging homes saw much higher bills after PUCO's order. The Ohio consumer advocate played a significant role in this case, which received high levels of attention from the media and state political figures. The perception was that major commissioner and staff turnover did not result from this rate case, however.

²⁷ Graphs reflect rates for AEP Ohio.

Mississippi, 2015²⁸

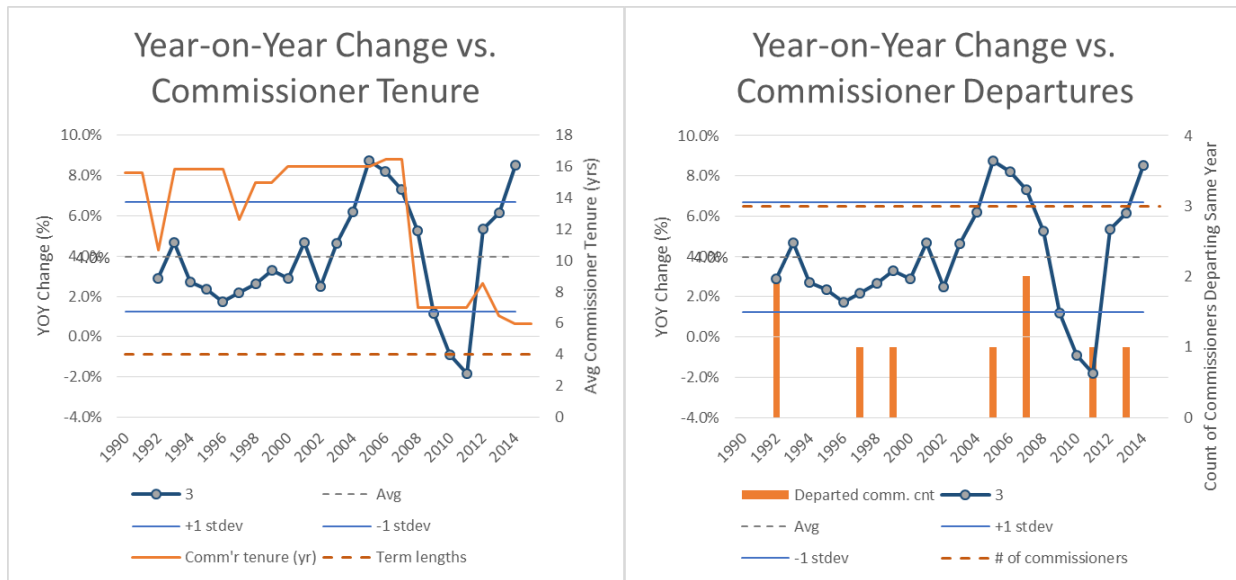


Figure 18: Retail rate change metrics and commissioner tenures for Mississippi

In 2010, with high levels of support from Mississippi ratepayers and the federal government, the state's largest utility began constructing an innovative generating plant in Kemper County, using pre-combustion carbon capture to remove carbon dioxide from gasified lignite coal. The gasification technology proved to be difficult to implement. Competition from low-cost natural gas and other fuel sources narrowed the financial margins for the project, and the absence of a federal CO₂ policy removed some incentive for carbon capture that may have been assumed at the start of the project. In June 2017, after the project was over budget and years behind schedule, the utility announced the plant would operate solely as a natural gas combined cycle generator. The state legislature allowed the utility to pass along approximately a third of the cost overruns to ratepayers, and the Public Service Commission grew increasingly uncomfortable with the arrangement as the cost overruns and delays mounted. Shortly before the company's June announcement, the PSC recommended that the plant run as a natural gas plant. This case demonstrates the public's willingness to pay for infrastructure up to a certain point. The commission had to simultaneously defend its past decisions on the plant and pursue the best possible outcome for ratepayers. During this period, the cost impacts of the project were not reflected in rate increases noted in the public record.

FINDINGS FROM INTERVIEWS

The project team drew the following conclusions from the interviews as consistent among all of these state experiences.

1. Customer dissatisfaction with the utility may be a better predictor of commissioner turnover than rate increases specifically.

Broad rate increases did not always create crises at commissions. Instead, crises were driven by either (1) issues affecting a small group of customers, such as in Colorado and Ohio, or (2) infrastructure challenges whose rate impacts were not yet clear, such as in Mississippi. Reliability was a key driver of crisis in Maryland in 2012. In some of these cases, the customer response or confusion about the commission

²⁸ Graphs reflect rates for Mississippi Power Company.

action may have contributed to turnover. Other factors matter a great deal when mixed in with rate and bill increases. NARUC staff may explore customer satisfaction data for future research.

Commissioners generally felt that ratepayers cared more about rate changes than bill changes. Even if bills did not rise significantly after a rate change, consumers were upset about paying more for the same electrons and tended to blame the commission for not delivering better service. Commissioners stressed the importance of explaining the reasoning behind rate cases to consumers and making sure rate cases visibly addressed the complaints ratepayers expressed. One commissioner relayed that his commission was blamed when a generation project initially supported by the public began to experience delays and cost overruns. Consumers felt lied to and the commission lost the public's trust by approving a project that did not deliver the results promised.

2. Rates seem to matter more than bills, with exceptions.

In the interviews, sources from five of six states said that rate increases mattered more than bill increases. The only exception was Ohio, where bills remained relatively level. Even though bill analysis was done in Maryland (where bills remained level), the perception of erosion of a customer's ability to influence that bill was important (for instance, the thought that "I use less but pay the same amount"). The media plays a role in emphasizing the importance of rates over bills by tending to cite the percentage increase in rates rather than the change in average bills.

One area of interest was that several of the interviewed state officials said that rates were not as important as other factors in creating crisis. It is worth noting that most of the situations in which commissions found themselves in crisis coincide with the times when some of their utilities were introducing rate increases of 15 percent or higher. However, this small subset of states does not reflect those with the highest rate increase experiences; historically, some states have had IOUs with over 150 percent rate increases. The states included in this analysis were chosen for their relatively recent crisis occurrence and availability of former regulators to be interviewed.

3. Subsets of customers matter: there's no average rate, average bill, or average customer.

Small groups of heavily affected ratepayers were outsized in their impact on controversies resulting from rate cases. For example, affected mining communities in Colorado, "electric heat" rate customers (rather than general residential rate customers) in Ohio, and the "first wave" of smart meter customers in Maryland were key players in those states' cases. These groups either received additional scrutiny from local media or organized themselves to become bigger players in the controversy.

"We all needed to be more sensitive about how the public views [rate changes]."

- *Former regulator*

Commissions face limited options to engage these groups and address their concerns. If possible, commissions should identify these groups as early as possible by looking beyond averages. Communications strategies are expanded upon in point #5 below.

4. Well-founded explanations for rate increases may go a long way in managing controversy.

Well-developed justifications of rate and bill increases contributed to ameliorating perceptions of rate increases among the general public. Even something as simple as pointing out that a utility needs a rate hike in order to pay for vegetation management, which will in turn improve reliability, can mollify public concerns. One former commissioner cited the example of a disgruntled ratepayer who asked at a public hearing why he had to pay for a new power plant when he had not paid for any others, showing the need for commissions to explain the ratemaking process to the public. However, commissioners are limited in how much they can say about active rate cases. Utilities also share a role in explaining the need for raising rates and how customer revenues can be put to beneficial use. Such explanations are especially important to smaller subsets of the public who are most affected by rate increases, either with the largest increases relative to their ability to pay or those affected in other ways.

5. Communication in a targeted way affected communities is effective.

Establishing targeted communications vis-à-vis affected communities was cited as a useful strategy. Commissions that targeted communications and mitigation following rate increases to heavily affected customers did well, like Ohio and Maryland in 2012. Those who communicated broadly fared less well, such as in the cases in Florida, Maryland in 2007, and Colorado.

"Going to the public hearings made it all real... [It] gives you a visceral understanding of how important what you do is."

As previously noted, there is no "general public." Specific members of the public are affected in different ways, and mass communications give them little opportunity for their specific issues to be heard and addressed. Even though the majority of public comments tend to be non-substantive in the context of the rate case itself, public hearings remain essential as a way to identify and mitigate the issues affecting those individuals or communities.

- Former regulator

In most cases in which commissioners communicate with the public, it may be helpful to first establish the basis of commission roles and responsibilities. This will help the public understand what to ask commissions to do in response to a problem. Andrew Melnykovich, director of communications at the Kentucky Public Service Commission, offered a number of essential points that commissions should emphasize in any public-facing communication:

- State legislatures and courts determine the commission's discretion, much like Congress and the Supreme Court limit what federal executive branch regulatory agencies can do. Similarly, commissions apply the rules – they don't write laws or set policy.
- Utilities submit justifications of the revenues they intend to collect from consumers. Commissions consider these justifications and decide which expenses can be recovered through rates.
- Commission actions, including ratemaking, are public processes subject to transparency requirements. All documents are publicly available, and the public has the opportunity to comment on the proceeding.

"We weren't good at telling our own story."

"We did not do an adequate job communicating, and commissions are not set up to do that."

- *Former regulators*

Commissioners felt that they and their commissions more broadly were ill equipped to communicate with the public and some said they would have fared better remaining silent. Several commissioners stressed the importance of public hearings as a way of holding themselves accountable to the public and allowing ratepayers to feel heard, even if commissioners are limited in addressing the specific details of a matter before the commission. The use of public hearings was thought to lessen blame on the commission for a contentious rate case.

FURTHER RESEARCH

Future studies across a larger sample of state commissions would be valuable in affirming the applicability of this study's findings to the general population of state commissions.

With a lack of conclusive statistical evidence to suggest a link between rate increases and commission turnover, the project team identified other possibly causative relationships that deserve additional research. The most obvious factor is governor turnover. Multiple commissioners cited governor changes in their own states as precipitating the departure of prior regulators (in appointed states). A future analysis might also filter out commissioner departures coinciding with governor departures. The analysis of possible rate effects could then be examined for the commissioner departures without governor departures. Some posited that increasing polarization and increasingly volatile shifts between political parties coincides with the period of perceived declining commissioner tenure. Commissions themselves do not have a political mandate and are generally seen by the public as apolitical; however, commissions are certainly tied to the overall political environment. In appointed states, governors often grant commissionerships to associates or supporters and typically have the authority to ask commissioners appointed by the previous governor to resign prior to the end of their terms. This is true regardless of commission performance and particularly true if the previous governor was of a different party. In elected states, commissioners may present themselves as overly political operators during the campaign, even taking positions on issues outside the commission's jurisdiction to win votes from increasingly partisan voters.

In cases of early resignation, some industry media do report the ostensible reason. From an initial examination of commissioners, reasons given for resignation include gubernatorial political changeover or controversy with the state senate. Other reasons include departures for private-sector jobs, federal appointments such as the Federal Energy Regulatory Commission or federal courts, or state appointments to other executive agencies or state courts. However, less detail is given on commissioners who are not reappointed. The reasons are sometimes speculated about in trade press or local media, but difficult to confirm. The politics of public utility commissions deserves further examination.

The other clear factor is customer satisfaction with utilities. Although the project team looked at limited publicly available data on customer satisfaction in the course of writing this paper, a more thorough analysis of proprietary survey data for residential, commercial, and industrial customers could prove illuminating in looking at how closely commission turnover and customer perception of utilities are linked.

Future work could also look beyond commissioner tenure to other factors. Many Americans may not know who the commissioner of their PUCs are, but may otherwise be very affected by rate or bill hikes. Although it was beyond the scope of this project, it would be very interesting to examine the number of unpaid bills or shutoffs as a result of price spikes and a comparison in the amount of revenue taken in before and after the spike to see if the spike actually increased revenue or if it remained flat after generation expenses and unpaid bills. Additionally, other political ramifications such as people who opted to get their generation from other sources in areas where this is possible would also be an interesting metric to analyze.

CONCLUSIONS

Public utility commissions have the difficult responsibility of balancing the need to sufficiently fund electricity delivery with the need to preserve just and reasonable rates. The project team's analysis indicates that the data do not show a statistical link between rate increases and shorter tenures by commissioners, but rate increases often occur in the context of more complex backgrounds. Rather, rate increases may introduce new or exacerbate existing circumstances that create crises at commissions, which can result in political intervention, media scrutiny, and commission turnover.

Strategies that acknowledge the variation in customers and the impacts of rate or bill changes on customers seem to be important in predicting whether rate increases can be managed without introducing a crisis at a state commission. Regulators recommended identifying differently affected customers, particularly those whose bills relative to income are expected to increase significantly as a result of a rate case, and looking beyond averages where possible.