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Utility regulation through legislation: A cautionary tale for legislators, regulators, stakeholders, and utilities

Paul J. Alvarez [a,*], Dennis Stephens [a], Sean Ericson [b]

[a] Wired Group, United States
[b] Integrated Energy Solutions Group, National Renewable Energy Laboratory, United States

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ABSTRACT

State legislatures in the U.S. are becoming increasingly involved in utility regulation. While state utility legislation can expand regulator authority, for example in the case of renewable energy or energy efficiency standard administration, it can also reduce it. Given the challenging nature of for-profit monopoly regulation, state utility legislation often reduces regulator authority unintentionally.

This editorial begins with an examination of the outcomes of state legislation related to baseload generation in the U.S. and the resulting impacts to customers, shareholders, and state economies. The record indicates that utility regulation through state legislation has caused significant economic harm, generally by encouraging for-profit utilities to make riskier investments. A description of more recent state legislation involving distribution grids is presented, along with evidence that increases in grid investment encouraged by state legislation has not improved the reliability of U.S. for-profit utilities.

The authors claim that features common to state utility legislation, particularly the requirement that utilities provide investment plans to regulators in advance, practically eliminates cost disallowance risk. This, in turn, reduces regulator authority despite legislative provisions intended to protect consumers. The authors hypothesize that the practical elimination of cost disallowance risk, combined with information and expertise asymmetry among regulators and stakeholders, encourages for-profit monopoly utilities to make grid investments that are not cost effective. The editorial concludes that legislators should avoid utility regulation through legislation, thereby preserving regulator authority, whenever possible. The authors also present their fifth annual Customer Value Ranking of U.S. investor-owned electric utilities. The ranking represents a comparison of the benefits utilities deliver to customers (measured by reliability performance and customer satisfaction) to the costs customers pay (measured by O&M and capital spending per customer).

1. Introduction

State legislatures are becoming increasingly involved in utility regulation. Renewable energy and energy efficiency standards represent the majority of these efforts. However, state legislators are growing increasingly concerned with electric (and gas) reliability, enacting legislation to encourage greater utility investment. Since the Florida legislature passed the first of these Acts in 2006, at least eight states – South Carolina, Georgia, Mississippi, Illinois, Indiana, Virginia, Missouri, and Ohio, plus a second instance in Florida – have passed similar legislation.

While interest in improved reliability is well-intentioned, this editorial argues that utility regulation through state legislation too often results in a reduction of state regulator authority and independence. This typically ends badly for both customers and shareholders. The economics and regulation of investor-owned utilities (IOU) are complex matters, and completely foreign to those most familiar with competitive businesses and markets. Legislation drafted by those unfamiliar with the tenets of monopoly regulation typically prompts unintended consequences. Specialized expertise is required. These are precisely the reasons why state legislatures established commissions to regulate IOUs in the first place.

This editorial is not intended to argue against all utility-related legislative action. There are occasions when a state utility regulator's role and/or authority should be expanded to incorporate new state policies and priorities, such as renewable generation and energy efficiency.

* Corresponding author.
E-mail address: palvarez@wiredgroup.net (P.J. Alvarez).

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However, state legislators are asked to pursue utility regulation via legislation only when absolutely necessary, and only with exceptional thoughtfulness and guidance. State legislators acting without the advice and counsel of experts inside and outside their state risk harming the very economies IOU-related legislative actions are intended to improve.

2. Background

State utility regulatory commissions were established by state legislatures across the US in the early 20th century specifically to serve as independent arbiters of the appropriate balance between utility shareholder interests and customer interests. Among the most important jobs of these state commissions is to rule on IOU rate increase requests. State legislators across the US should appreciate the importance of state commissions' roles, responsibilities, and independence. To appreciate these is to appreciate the perils of state legislative involvement in the complexities and details of IOU regulation.

Above all, legislation should steer clear of anything which might interfere with regulators' determination of the appropriate balance between shareholder and customer interests. As this article demonstrates, simply reiterating in legislation that regulatory authority remains supreme does not ensure such an outcome. Legal and practical realities intrude upon best legislative intentions.

The modern era of state legislation to encourage utility investment began in Florida in 2006. Intended to encourage investment in nuclear generation expansion, SB 888 included, among other provisions, two which would stand out for their inclusion in virtually all subsequent state legislation designed to encourage utility investment. These are 1) The utility must provide its investment plans to state regulators in advance (Section 43); and 2) Annual rate increases to cover capital spent in accordance with approved plans, even for incomplete projects, is authorized without rate cases (Section 44).[1]

To the casual observer not steeped in for-profit monopoly utility regulation, these provisions might make sense. But in the arcane world of IOU regulation these provisions, combined with utilities' vastly greater information and expertise relative to that of the stakeholders with responsibility for challenging utility plans, decimate regulators' single most important control over excess IOU investment. That control is cost disallowance risk.

Once the threat of cost disallowance is removed, investment risk shifts from utility shareholders to utility customers. As one might imagine, a utility with less cost disallowance risk is likely to make more, and riskier, investments. While customers can be harmed by associated increases in rates and risks, experience since 2006 seems to indicate that shareholders are also typically harmed. Before proceeding to the mechanics of how the provision of advance investment plans and annual rate increases without rate cases shifts risk from utility shareholders to utility customers, let's examine how legislation related to baseload plants has historically turned out for customers and shareholders.

3. Regulation through legislation: a history of customer and shareholder harm

In response to Florida's SB 888 of 2006, one utility made risky plans to update a nuclear plant by replacing the plant's aging steam generators. In the attempt the nuclear containment walls were damaged so badly the plant was permanently shuttered. Another Florida utility's response to SB 888 was to develop plans and pursue permits for a new nuclear plant. Though the plant was never built, customers were still responsible for planning and permitting costs per SB 888. Some estimate the costs to Florida customers of these two incidents exceeded $2.8 billion.[2] Customers are still paying for SB 888 consequences today, though the Florida legislature repealed SB 888 in 2013 to limit further damage to the state's economy.

South Carolina passed its version of the Florida approach, the Base Load Review Act, in 2007.[3] The attempted addition of two reactors to the state's existing nuclear plant following the Act was abandoned at a late stage, with costs estimated at $9 billion.[4] While customers are shouldering many of these costs, the majority of customer cost responsibility was avoided when the principal utility involved in the nuclear expansion was acquired at a deeply discounted price per share, costing many shareholders dearly.

The Mississippi legislature passed the Rate Mitigation and Reduction Act in 2008.[5] As in Florida and South Carolina, the Act required advance plans from utilities, and provided for annual rate increases to cover capital spent according to approved plans. In response one utility attempted to build a new coal plant featuring cleaner, first-of-its-kind coal gasification technology. The coal gasification technology led to massive cost overruns and could never be made to work. While prompt and prudent action by the Mississippi PSC limited plant-related customer rate increases to 18 %, estimates of the cost of the project to the utility's shareholders exceed $6 billion.[6]

In 2009 the Georgia legislature passed its version of the Florida approach, the Nuclear Energy Financing Act.[7] The expansion of a nuclear plant which commenced after the Act's passage is billions of dollars over budget and several years behind schedule. One utility involved is reportedly selling assets to boost cash flow, depriving shareholders of future profits from those assets. Customers are taking a hit too, as the utility recently submitted a rate change request for just one of the two new nuclear units. If approved, the utility estimates the change will increase an average residential bill by $48 a year.[8]

The most infamous example of regulation through legislation may be Ohio's House Bill 6 (HB6). Opponents charged HB6, enacted in 2019, unfairly subsidized the state's coal and nuclear plants. The circumstances surrounding the legislation's passage are under federal investigation; the Speaker of the Ohio House has been indicted for conspiracy and been expelled by his peers; and the Ohio PUC Chair has resigned. As a result of these developments, the subsidy components of HB6 were repealed in March. But while customers were spared associated rate increases, HB6 opponents argue that customer harms will continue, as reductions in energy efficiency standards have not yet been repealed from HB6. For their parts, shareholders of the primary utility accused in the scandal have yet to fully recover from the 35 % share price drop in the days immediately following FBI indictments in July of 2020.

To summarize, in all of these states, both customers and shareholders appear to have suffered from regulation through legislation. Many would argue that these unfortunate outcomes can be linked to industry changes, not regulation via legislation. To be certain, a number of factors have reduced the need for baseload generating plants, and have caused many to dismiss the concept entirely. Environmental concerns, energy efficiency, customer-owned generation, wholesale energy and capacity

[1] Florida legislature, 2006. SB 888.

[2] Moore, T. *How Florida Created – and Killed – a Nuclear Building Spree Like South Carolina's.* Post and Courier, Charleston, South Carolina. December 26, 2017.

[3] South Carolina legislature, 2007. S431.

[4] Wilks A. and Brown A. *(Three) years later: How the fallout from SC's $9 billion nuclear fiasco continues.* Post and Courier, Charleston, South Carolina. July 31, 2020.

[5] Mississippi legislature, 2008. SB 2793.

[6] Tait, D. *Southern Company's Big Bets Lead to Loss of Gulf Power.* Energy & Policy Institute blog. May 31, 2018. Available at https://www.energyandpolicy.org/southern-companys-big-bets-lead-to-loss-of-gulf-power/.

[7] Georgia legislature, 2009. SB31.

[8] Georgia Public Service Commission Docket No. 43838. Application by Georgia Power Company June 15, 2021.

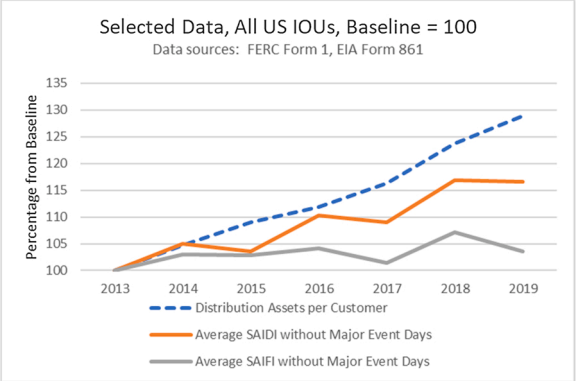


Fig. 1. Distribution Assets per Customer Compared to Reliability Metrics, US IOUs, 2013-2019.

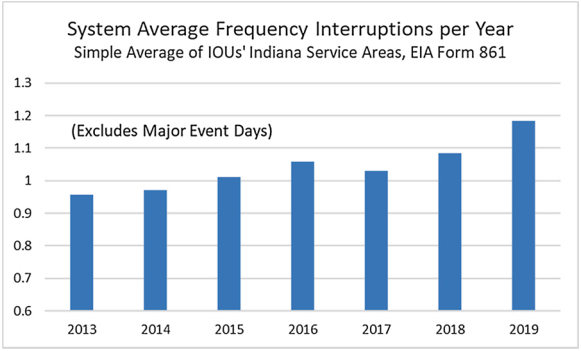


Fig. 2. SAIFI without Major Event Days, Indiana Service Areas of IOUs, 2013-2019.

markets, integrated resource planning, and the transition from a production economy to a knowledge economy have all taken their toll on the need for new investment in the fossil- and nuclear-fueled generation in which IOUs have historically specialized. As a result, IOU's investment focus has moved from generation to distribution in recent years, and regulation through legislation has moved with it.

4. Regulation by legislation: the action moves to distribution grids

While the need for regulated baseload has fallen, IOU needs to grow share prices, and the regulated earnings growth on which share price growth depends, continue. IOUs have identified that distribution grids represent an ideal target for increased levels of regulated investment, and therefore increased opportunities for earnings and share price growth. Legislators have observed infrastructure failures that caused many states significant economic and societal harm in recent years. Both IOUs and legislators therefore find it difficult to resist the siren calls of "improved reliability" or "grid modernization". Regulators, for their part, do not wish to be perceived as impeding progress on these ostensibly worthwhile goals.

While some investment in reliability and grid modernization (for example, to accommodate increasing levels of distributed energy resources) is warranted, legislators (and regulators) must recognize that not all grid investment constitutes good grid investment. Indeed, increased grid investment does not necessarily result in improved grid reliability (see Fig. 1; higher SAIDI and SAIFI denote deteriorating reliability)[9]. Such decisions require technical understanding of the costs and benefits of such investments, which is precisely the job of the state utility commissions.

Legislators (and regulators) should also recognize that not every energy problem is one that IOU capital must solve. Of those problems for which utility capital is well-suited, not all must be solved today, nor all at once. Some solutions to identified issues are less capital intensive than others. Some "problems" utilities cite in requests for massive distribution investments are not problems at all. (The authors recently testified in a case involving one utility's request for $1.2 billion in capital, or almost $2500 per customer, to improve reliability. The utility's request was prompted by state "grid improvement" legislation, though the utility's reliability performance had been in the top 10 % among US IOUs for seven straight years.)[10]

The distribution grid we have today will evolve into the grid we will need over the next few decades, as the need arises on a circuit-by-circuit basis. The distribution planning processes all utilities use today, with minimal modifications for electrification and increasing distributed energy resource capacity, will ensure this[11]. IOUs are already authorized to earn a return on investment to ensure they can secure the capital required for enhancements as needed. Unnecessary additional incentives to invest, as authorized by legislatures, will result in unnecessary additional investments and risk-taking by utilities, along with premature rate increases. These rate increases might better be reserved for future use, for example to accommodate electrification and distribution energy resource capacity as they grow.

The current shift of regulation through legislation to the distribution side of the industry began in Illinois with the Energy Infrastructure Modernization Act of 2011.[12] Approved by the legislature over then-Governor Quinn's veto, the circumstances surrounding the legislation's passage are now under federal investigation.[13] Consistent with legislation in various states to encourage baseload generation, the Act requires advance plans from utilities wishing to make grid modernization investments, and authorizes annual rate increases for spending on approved plans without a rate case.

One Illinois utility increased its gross distribution plant investment by $5.2 billion (84 %) since the legislation passed. At about $1350 per customer, this placed the utility in the top 25 % of all US IOUs in distribution plant growth from 2011 through 2019. Yet the spending appears to be a solution in search of a problem. In 2013, the last year before reliability-related investments from the Act began having a meaningful reliability performance impact, the average customer of the utility experienced a service interruption just once every 12 months.[14] This performance was already good enough to place the utility in the top quartile among US IOUs[15]. By 2019, the average customer of this utility was experiencing an outage just once every 15 months, a respectable 25 % improvement.[16] But would most customers agree the improvement was worth $1350, not including $1200 to $1400 in carrying charges (profits, interest expense, taxes, etc.) those customers will likely be required to pay the utility over the next 20–30 years?

Indiana passed its grid modernization legislation in 2013 with the same requirements for submitting plans in advance, and authorizing

[9] SAIDI is System Average Interruption Duration Index; SAIFI is System Average Interruption Frequency Index.

[10] As measured by System Average Interruption Frequency Index without Storms, EIA Form 861.

[11] NARUC/NASEO Task Force on Comprehensive Electricity Planning. *Flowchart of Idealized Comprehensive Electricity Planning Process.* Jade Cohort Roadmap, page 5. Available at https://www.naruc.org/taskforce/resources-for-action/roadmaps/.

[12] Illinois Legislature, 2011. Public Act 097-0616.

[13] US District Court, Northern Illinois, Eastern Division. Deferred Prosecution Agreement with Commonwealth Edison Company dated July 17, 2020.

[14] As measured by System Average Interruption Frequency Index without Storms, EIA Form 861.

[15] Ibid.

[16] Ibid.

annual rate increases without a rate case for spending on plans approved by the IURC.[17] Since then, Indiana's for-profit utilities have spent billions of dollars on their distribution grids. Yet the average interruption frequency exhibited by Indiana's for-profit utilities has deteriorated since 2013, from one every 12.5 months in 2013 to one every 10.1 months in 2019 (see Fig. 2; an interruption frequency of 1.0 equates to an average of one interruption every 12 months per customer).[18]

In 2017, Virginia passed SB 1473, which forced the State Corporation Commission to consider the undergrounding of overhead lines a prudent capital spend.[19] Yet at a cost of $10,000 to $20,000 or more *per home*, research indicates that undergrounding overhead lines is simply not cost-effective. A Texas-based study by Lawrence Berkeley National Laboratory indicates that all benefits from undergrounding amount to just $0.30 for every $1 spent.[20] But the Virginia legislature passed the Act anyway, after the Commission repeatedly rejected utility undergrounding plans due to a lack of cost-effectiveness. While undergrounding investments might be good for a utility's shareholders, related rate increases without sufficient benefits are not likely good for a utility's customers, or for Virginia's economy.

Storm protection was also the impetus for Florida's second foray into regulation by legislation. SB 796, passed in 2019, required Storm Protection Plans from Florida's for-profit utilities, and authorized annual rate increases without a rate case for spending consistent with plans approved by the PSC.[21] The utilities responded with $16.9 billion in proposed capital spending over 10 years – a whopping 62 % increase over the gross distribution plant in service of Florida IOUs, and as much as $1000 per customer (not including carrying charges). The spending is targeted largely to undergrounding overhead lines. Yet, due to the strategy's extremely high costs, no more than a few percent of Florida customers will see their overhead lines undergrounded as part of these plans.[22]

The Missouri legislature passed SB564 in 2018. As in the other states, the Act requires advance capital investment plans and authorizes annual rate increases to cover spending in accordance with approved plans.[23] Missouri's investor-owned utilities have responded with multi-billion dollar grid investment plans. It is far too early to determine the effectiveness of these plans at improving reliability, but a cursory review indicates grid investments similar to those made by Indiana utilities in response to grid legislation in that state. As indicated above, the Indiana grid investments do not appear to have been effective at improving reliability to date.

5. The mechanics: how regulation through legislation reduces commission authority

Legislators involved in all these states will likely point to countermeasures in legislation intended to protect consumers. Such measures do not appear sufficient to counter unintended consequences embedded in monopoly regulation. In Illinois, legislators would point to penalties which will apply if the utilities miss pre-established performance targets. Upon closer examination, less than ½% of Illinois utilities' rates of return are at risk, assuming every single performance target is missed. Thus, shareholders will benefit from the investments regardless of utility performance.

Another alleged consumer protection is the rate increase cap, for example, no more than 2.5 % annually. A number of mechanisms, from refunds of excess accrued deferred income tax balances, to falling natural gas prices, to deferrals of profits for collection in future periods, can be used to manage around this requirement. Additionally, rate increase caps do nothing to assure customers that investment plans were optimized, or that the performance improvements could not have been obtained less expensively, or that the capital could not have been put to higher or better use, or reserved for more critical needs in the future.

Excessive earnings tests, in which earnings a certain amount above the authorized rate of return are shared with customers, are another common consumer protection legislators tout. I note that shareholders keep excess earnings within the deadbands utilized in such tests. Further, a 1% rate refund from such a provision pales in comparison to a 10 % or 20 % rate increase required to pay for excess investments encouraged through legislation.

The most significant consumer protection argument most legislators would make is that nothing in passed legislation limits state regulator authority to disallow cost recovery. Much legislation specifically reiterates state regulator authority. But unfortunately, legislative language does not preclude the unintended consequences of 1) the provision of investment plans in advance; and 2) the authorization of annual rate increases without a rate case to cover capital spent in accordance with approved plans. Let's now return to the premise of this editorial.

The premise is that these two provisions effectively eliminate cost disallowance risk. The elimination of cost disallowance risk stems from regulated utilities' commanding advantage over state utility commissions and stakeholders in resources, information, and expertise. This advantage virtually ensures that utility investment plans will be approved regardless of content or cost effectiveness.

Historically, for-profit utilities have always operated in fear of cost disallowances. It is for fear of such disallowances that utility spending has historically been "self-policing". Because of the threat that recovery of costs from customers could be disallowed, a for-profit utility could generally be counted upon not to spend any more capital than necessary. This has been especially true in electric distribution, as utilities have historically spent no more than the capital needed to accommodate growing loads. In any event, these capital costs could always be recovered through increases in electric sales volumes.

Today, however, electric sales volumes are falling. Utilities increasingly employ complex technical arguments to justify distribution capital spending increases. Utility plans include vague promises of reliability improvements and increased accommodation of distributed energy resource capacity with no numerical targets for performance accountability. Stakeholder information and expertise deficiencies regarding distribution planning, operations, and investment typically cannot produce evidence sufficient to challenge complex utility justifications in a compelling manner.

A state regulator can only make decisions based on the evidence offered. Given utility threats that reliability will deteriorate if their plans are not approved, and absent compelling evidence to the contrary, state regulators understandably err on the side of caution. The result is that commissions generally approve utility investment plans presented in advance with minimal challenge or modification.

Once a utility investment plan has been approved by a commission, disallowance of costs incurred in pursuit of the plan is practically impossible. A utility would logically argue that a stakeholder's opportunity to present evidence against such plans was available when the plans were first presented. To disallow costs after a utility had spent capital on a plan a commission had previously approved would clearly be unfair to the utility. Further, large investment recovery disallowance raises utilities' cost of capital, which ultimately harms customers. In states which have enacted legislation with this combination of advance plan presentation and annual rate increases, none has even begun to

[17] Indiana Legislature, 2013. House Enrolled Act 1470.
[18] Ibid.
[19] Virginia Legislature, 2017. SB 1473.
[20] Larsen P. *A method to estimate the costs and benefits of undergrounding electricity transmission and distribution lines.* Lawrence Berkeley National Laboratory and Stanford University. LBNL-1006394. October, 2016.
[21] Florida Legislature 2019. SB 796.
[22] Alvarez P. and Stephens D. *Electric Utility Storm Protection Plans: A Bonanza for Utilities, a Bust for Consumers and the State.* AARP Florida Whitepaper. September, 2020. Available at https://states.aarp.org/florida/storm-protection-plans-a-bonanza-for-electric-utilities-a-bust-for-consumers.
[23] Missouri Legislature, 2018. SB564.

Table 1
Wired Group 2020 Customer Value Ranking of U.S. investor-owned electric distribution utilities.

2020 Overall Customer Value Ranking

Overall Customer Value Rankings are determined by individual rankings in Capital Spending, O&M Spending, SAIDI without Major Event Days (lower = higher ranking) and JD Power Overall Residential Customer Satisfaction Score (higher = higher ranking). A utility missing any one of the four individual determinants is not included in the Overall Rankings.

Rank	Utility	Rank	Utility	Rank	Utility
1	Florida Power & Light	34	West Penn Power	67	Alabama Power
2	Mid-American Energy	35	Westar Energy	68	Appalachian Power
3	Toledo Edison	35	Potomac Electric Power Co.	69	Versant Power
3	PSE&G (NJ)	37	Delmarva	70	Ameren Missouri
5	Northern States Power - MN	38	Public Service New Mexico	71	Wheeling Power
6	Nevada Power Co	39	Rochester G&E	72	SWEPCO
6	Wisconsin Public Service	40	Madison G&E	72	Southern California Edison
8	PPL Corporation	40	Black Hills Colorado	74	Avista
8	Public Service Colorado	40	Ameren Illinois	74	Penelec
10	PacifiCorp	43	Duke Energy Carolinas	76	Evergy Kansas City
11	Kentucky Utilities	44	Duke Energy Progress	77	New York State E&G
11	Northern States Power - WI	45	Duke Energy Indiana	77	Central Maine Power
13	Indianapolis Power & Light	45	Green Mountain Power	79	Niagara Mohawk
13	Wisconsin Electric	45	Consumers Energy	80	Massachusetts Electric
15	Commonwealth Edison	45	Penn Power	81	Narragansett Electric
16	Idaho Power	49	Tampa Electric Company	81	Central Louisiana Electric Co.
17	Louisville Gas & Electric	50	Mississippi Power	83	Jersey Central P&L
18	Gulf Power	51	El Paso Electric	84	Otter Tail Power
18	Ohio Edison	52	Duke Energy Florida	85	Black Hills Power
20	Dayton Power & Light	52	Consolidated Edison	86	United Illuminating
21	Georgia Power	54	South Carolina E&G	87	MonPower
22	Public Service Oklahoma	55	Entergy Mississippi	88	Central Hudson G&E
23	Duquesne Light	56	Met-Ed	89	San Diego Gas & Electric
24	Southwestern Public Service	56	Interstate Power & Light	89	Public Service New Hampshire
25	Baltimore Gas & Electric	58	Dominion	91	Entergy Arkansas
26	Potomac Edison	58	Indiana-Michigan Power	92	Evergy Greater Missouri
27	Ohio Power	60	DTE Energy	93	Orange & Rockland
28	PECO	61	Eversource	94	Entergy New Orleans
29	Puget Sound Energy	62	Entergy Texas	95	Empire District Electric
29	Oklahoma Gas & Electric	63	Minnesota Power	96	Vectren
29	Wisconsin Power & Light	64	Northwestern Energy	97	Connecticut Light & Power
32	Duke Energy Kentucky	65	Atlantic City Electric	98	Pacific Gas & Electric
32	Portland General Electric	66	Arizona Public Service	98	Kentucky Power

address these conundrums, let alone solve them.

In this manner, the annual rate increases on approved investment plans thereby proceed as authorized by legislation without a rate case, and without significant further challenge. In practice, therefore, despite reiterations of state regulators' ultimate authority, legislation requiring advance investment plans and authorizing annual rate increases without rate cases clearly have the effect of reducing regulator authority and independence.

6. The takeaways and the 2020 customer value ranking of US IOUs

The primary takeaway for state legislators is that regulating utilities through legislation is not the "no brainer" it appears to be at first glance. The authors encourage legislators to carefully consider the observations in this article: 1) Regulation through legislation rarely ends well for customers, shareholders, or state economies; 2) In practice, requirements for advance investment plans and authorizations of annual rate increases reduce regulator authority and independence regardless of legislative language to the contrary; and 3) For-profit monopoly utility regulation is extremely complicated, and associated expertise highly specialized, meaning that utility regulation is best left to state regulators whenever possible.

State utility regulatory commissions have been specifically authorized by state legislatures to determine the appropriate balance between utility shareholder and utility customer interests. For over a century now, the joint stewardship of commissions, utilities, and stakeholders has delivered the safe, reliable, affordable utility service we enjoy today, representing an undeniably significant contribution to the success of the US economy. State utility commissions must not be biased by legislation if these successes are to continue. When it comes to IOUs, it is highly possible that the best action state legislators can take to improve their state economies is to let state utility commissions do their jobs.

While this editorial implies concern over IOU lobbying efforts in state legislatures, the authors recognize that US economic success over the last century is due in part to IOU investment. Some IOUs do a better

job than others of delivering value to customers per dollar charged to customers. It is in this spirit, and to encourage some healthy competition between IOUs, that the authors offer their annual US electric IOU Customer Value Ranking.

Since 2016, the authors have calculated the annual ranking by comparing US IOUs on what their customers get (as measured by reliability performance and JD Power customer satisfaction survey scores) for what their customers pay (as measured by O&M spending and gross distribution plant per customer). Sources for the financial and operating data are FERC Form 1, Energy Information Administration Form 861, and J.D Power and Associates. Utilities with one of the four data points missing (reliability, JD Power satisfaction score, O&M spending, and gross distribution plant per customer), are excluded from the ranking.

The ranking methodology incorporates performance metric adjustments calculated through ordinary least squares regression analysis. Performance results are adjusted up or down for various utility characteristics, based on correlations between characteristics and metrics demonstrated in the FERC, EIA, and JD Power data. Examples of some characteristics with statistically significant correlations to some performance measures include customer density per line mile, customer counts (utility size), and heating and cooling degree days. The regression analysis incorporates thousands of observations from 2010 to 2019, but the number of characteristics exhibiting statistically significant correlations to performance is small. The magnitude of adjustments specified by the regression analysis is also generally small.

Table 1 provides the results of the authors' 2020 Customer Value Ranking. Rankings for each of the four individual metrics, and historical results of the rankings since 2016, are available at http://utilityevaluator.com/customer-value-rankings.html.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Paul J. Alvarez is the President of the Wired Group.

Dennis Stephens serves as the Wired Group's Senior Technical Consultant.

Sean Ericson is an Energy Economist who was recently awarded a PhD in Economics from the University of Colorado.