



Ratemaking as Climate Adaptation Governance

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Electric utilities are directly affected by, and in some cases are a source of, many pressing climate adaptation challenges: wildfires, vulnerable infrastructure, extreme storms, and drought. The state Public Utilities Commission (PUC) is one of the most consequential government agencies guiding the electricity sector's response to climate change. Rate-regulated utilities may not charge ratepayers for new capital investments without PUC approval. When PUCs decide which costs are eligible for rate recovery, they also define which risks utilities seek to manage and which hedging strategies they use to do so. This Article argues that the foundational principles of ratemaking allow the state PUC to manage many aspects of electricity sector adaptation planning, coordination, and implementation. The Article begins with an overview of ratemaking for electric utilities and identifies how the process is an exercise in risk management. The Article then explains how a risk governance perspective can position the PUC to explicitly incorporate climate adaptation into ratemaking procedures as well as help coordinate adaptation policy across multiple agencies.

Keywords: climate adaptation, energy, public utilities, regulation, risk governance

INTRODUCTION

Electric utilities are directly affected by, and in some cases are the source of, many of society's most pressing climate adaptation challenges: wildfires, vulnerable infrastructure, extreme storms, extreme temperatures, and drought. In most states, ratemaking decisions by the Public Utilities Commission (PUC) directly influence how electric utilities respond. Investor-owned utilities serve almost three quarters of U.S. electricity customers (U.S. Energy Info. Admin, 2019a). These rate-regulated utilities may not charge ratepayers for new capital investments without PUC approval. When PUCs decide which costs are eligible for rate recovery, they also define which risks utilities seek to manage and which hedging strategies they use to do so.

This Article argues that the foundational principles of ratemaking allow the state PUC to manage many aspects of electricity sector adaptation planning, coordination, and implementation. Ratemaking includes many of the characteristics of effective climate adaptation governance: flexible statutory authority for agencies overseeing critical sectors of the economy, the ability to collect and respond to new information, and the ability to direct capital to ensure delivery of essential services. The manner in which PUCs exercise their authority will determine how utilities prepare for, and respond to, a changing climate.

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The Article begins with an overview of ratemaking for electric utilities and identifies how the process is an exercise in risk management. The PUC pursues the traditional goals of affordable rates, reliable service, and financial viability for the utility by mitigating certain risks financial and technical risks, and allocating a broader range of risks among utilities, ratepayers, and society. The Article then explains how a risk governance perspective can position the PUC to explicitly incorporate climate adaptation into ratemaking procedures as well as help coordinate adaptation policy across multiple agencies.

RATEMAKING AND RISK MANAGEMENT

The electricity sector's climate adaptation challenges have been in sharp relief in recent years. Catastrophic wildfires have caused severe damage in western states, some of which were ignited by electricity infrastructure. Utilities along the Gulf Coast and East Coast have faced strong hurricanes and historic floods in recent years. In the first half of 2021 alone, record-breaking heat led to rolling blackouts in the Pacific Northwest, a severe winter storm caused widespread power outages in Texas and pushed the state's grid to within minutes of total failure, a megadrought in California threatened hydropower resources and increased the risk of another catastrophic wildfire season, and the Atlantic hurricane season was off to another early start (Cappucci, 2021; Douglas, 2021; ERCOT, 2021; Patel, 2021; Singh, 2021). These are immediate operational threats for the nation's complex electricity system, and highlight the direct link between electricity decision-making and the economic and social risks presented by a changing climate. Ratemaking by state PUCs will play a pivotal role guiding utilities' responses.

Ratemaking reflects a century-old compromise. States grant electric utilities exclusive licenses to sell electricity to retail customers within their respective service territories. In exchange, the PUC ensures that a monopoly utility's rates are reasonable and utility investments produce tangible benefits for ratepayers. Rates must also allow a utility the opportunity to earn a reasonable return on investments and attract capital to meet future electricity demand (Bluefield Water Works, 1923).

State laws generally require that electricity rates be "just and reasonable," that utilities choose the least cost option for providing reliable electricity, and that utilities may only recover costs that are prudently incurred (Cal. PUC). PUCs have broad discretion when applying these principles. Historically, commissions apply the concepts narrowly, focusing on fuel costs, available technologies, and changing electricity demand due to population growth, but ignoring other factors with direct impacts on costs and reliability. For example, least cost can depend upon the time horizon under consideration, as regulatory changes can increase costs significantly, but commissions are typically reluctant to approve higher costs to mitigate regulatory risk (Monast, 2015).

PUCs set rates through quasi-judicial processes, hearing evidence about a utility's costs presented by parties and seeking a balance that ensures reliable service, keeps rates affordable, and allows utilities to earn reasonable returns

sufficient to compensate investors and attract capital for future needs (Swanson Katz and Schneider, 2020). In some states, PUCs use a similar process to evaluate utilities' integrated resource plans that assess future generation needs and investment options (Wilson and Biewald, 2013). In between formal rate cases, PUCs hold proceedings to consider such issues as whether capital expenditures are prudent and thus eligible for a rate of return for utility shareholders, whether to adjust allowable fuel charges, and whether to approve rate increases due to new regulatory requirements.

Balancing the multiple goals of ratemaking is an exercise in mitigating and allocating risk. The process mitigates financial risk to investors by protecting utilities from competition and providing a high degree of certainty regarding returns. Ratemaking mitigates financial risk to ratepayers by preventing the utility from using its market power to drive up costs and by controlling which costs monopoly utilities may pass on to customers. Allowing the utility to earn a competitive rate of return for shareholders and allowing it to charge customers for capital investments helps mitigate reliability risk by facilitating system planning and infrastructure investments.

The process also allocates risks among utilities, ratepayers, and society. Ratepayers are often responsible for compensating utilities for their investments even if the investment becomes uneconomic before it is fully amortized (Webb et al., 2020). This provides a high degree of certainty for investors and lenders, helping the utility raise capital and keep borrowing costs low, but it does not remove the risk altogether. In exchange for the investor certainty and low borrowing costs, ratepayers bear much of the financial risk once a PUC incorporates a capital expenditure into utility's rate base, insulating the utility from changing market conditions. Similarly, ensuring that a utility may pass reasonable fuel costs to ratepayers helps insulate the utility from price fluctuations but may expose ratepayers to those same risks. A PUC's focus on low-cost investments may also prioritize generation options with greater public health and environmental impacts, thus keeping electricity rates lower but shifting costs and burdens elsewhere in the economy¹.

RATEMAKING'S ADAPTATION GOVERNANCE POTENTIAL

Embracing the risk governance role of the PUC is the key to facilitating a more comprehensive response to climate change. The traditional approach to risk and ratemaking evolved based on predictable weather patterns, stable electricity demand growth, and a limited set of choices for generating electricity. Recurring threats to infrastructure caused by droughts, fires, storms, and extreme temperature swings have direct impacts on system reliability and rates. Viewed in this light, climate adaptation risks are similar to the risks typically addressed through the ratemaking process. The PUC's flexible statutory

¹For a more thorough discussion of the risk allocation, risk mitigation, and risk creation roles of ratemaking, see Monast (2021). Precautionary Ratemaking. *UCLA Law Review* 69: in press (<http://ssrn.com/abstract=3898844>).

authority allow it to consider whether, and how, to mitigate and allocate risks created by these emerging threats.

The multiyear drought in the western U.S. in an informative case study in climate risk and PUC authority. The increasing population living near wildland vegetation make wildfires more likely, more deadly, and more expensive (Radeloff et al., 2018). Existing power lines through a dry forest heightens the likelihood of fire even if the utility performs regular maintenance and vegetation management along rights-of-way. Depowering transmission lines helps protect the public during periods of extreme risk, but recurring power shutoffs are a drastic shift for the utility's obligation to provide reliable power and creates additional public safety risks². Other options, such as shifting to a more distributed electricity grid that does not rely upon vulnerable transmission lines or burying power lines in high-risk areas, can mitigate reliability and public safety risk but may be cost prohibitive. Further complicating matters, risk mitigation by electric utilities cannot eliminate other sources of wildfire risk (Baker, 2017). Lightning strikes and human activities such as campfires, burning brush, and fireworks can also cause devastating fires.

Prioritizing long-term risk mitigation rather than low electricity rates in the near-term can expand the types of investments appropriately included in electricity rates, allowing consideration of more costly investments to hedge against the potential for widespread infrastructure damage or threats to public safety. A risk governance approach can also determine which risks to mitigate, which to address outside the ratemaking context, and which to accept.

PUCs already engage in adaptation-related risk management to varying degrees, but they may not refer to it as such. For example, PUCs approve costs for storm preparation and recovery, and many states authorize investments to redesign infrastructure in areas prone to hurricanes and floods (U.S. Dept. of Energy, 2010). Enhanced vegetation management to reduce fire risk and winterizing power plants in areas that have not historically been vulnerable to severe cold spells help increase resiliency to extreme weather events.

There are important limitations with a case-by-case approach to extreme weather, fires, and other natural disasters. Focusing on immediate needs may continue path dependency based on existing system design, locking in infrastructure costs and overlooking higher cost options with greater risk mitigation potential. For example, improved vegetation management may help reduce the chance that transmission lines will spark wildfires, but a more decentralized system with less dependence on transmission lines through fire prone areas may have greater risk reduction benefits and enhance reliability during wildfire season.

²For example, power shutoffs by PG&E in 2019 affected millions of customers and provided little warning (MacMillan and Siddiqui, 2019). Residents who depend on electricity to operate oxygen machines and other life-saving electronics had limited time to relocate or buy generators (Chabria and Luna, 2019). The power outage also caused 874 cell towers to shut down, creating additional public safety risks (CBS SF Bay Area, 2020).

Furthermore, a case-by-case, or disaster-by-disaster, approach may also fail to consider near-term responses in the context of other policy and technology changes that may also increase costs. Climate change is only one of the factors complicating electricity sector planning. Utilities and regulators are navigating changes in energy economics and technologies. Older coal and nuclear plants are retiring, the pace of electric vehicle adoption is uncertain, and advances in storage technologies could fundamentally change the role of renewable energy (Diaz, 2021). More states are also adopting aggressive decarbonization goals, which will require resources and will affect the price of electricity (U.S. Energy Info. Admin, 2019b). A broader risk management view of ratemaking can seek to optimize adaptation-focused investments with these other changes affecting electricity grids.

Some PUCs take a more comprehensive approach to climate-related risk assessment. The California PUC, for example, requires the state's investor-owned utilities to conduct regular vulnerability assessments of their infrastructure, operations, and services, as well as the communities they serve (California PUC, 2020a,b). However, these broader PUC-directed risk assessments are also inherently limited³. Many of the risk drivers are beyond the reach of the PUC and balancing risk tradeoffs often requires a wider range of expertise and resources than are typically found at PUCs or the utilities they oversee.

Nonetheless, PUCs can contribute to adaptation governance even where they do not have direct authority. Climate adaptation requires weighing the longer-term solutions within the direct control of the electricity sector, as well as balancing the cost of these adaptation measures with the broader needs of the electricity sector and society. There is no single federal or state regulator that considers electricity sector risks and tradeoffs in a comprehensive manner. The Federal Energy Regulatory Commission focuses on interstate electricity markets and infrastructure. Regional transmission organizations (RTOs) and independent system operators (ISOs) manage wholesale electricity markets in many states. State and federal environmental regulators focus on public health and environmental impacts. Local planning authorities may oversee aspects of infrastructure siting and safety, but their authority may be limited by geography or the scope of their jurisdiction.

PUCs can help fill the gap by requiring utilities to expand the scope of their integrated resource plans and vulnerability assessments. These are recurring risk assessments that can inform climate adaptation planning across multiple agencies. Broader risk assessment can change the financial calculus for some investments. They can also examine the adaptation benefits of different grid options, as well as the economic and social impacts if the electricity system fails to mitigate certain risks and how those impacts may be borne in other ways. The PUC could use these processes to assess risks

³Ziava, S., and Chhabra, M. (2021). *Climate Adaption for Energy Utilities: Lessons Learned from California's Pioneering Regulatory Actions* (article to be published as part of the Frontiers in Climate, Coordinating Climate Adaptation collection).

beyond its immediate jurisdiction, particularly if those risks have implications for electric utilities and their customers. The PUC, or another designated state agency, could then use the risk assessments to develop multi-agency responses and identify policy priorities.

A PUC-led approach to climate adaptation governance is not a substitute for new state and federal policies designed explicitly to address climate change mitigation and adaptation. Effective multi-agency coordination would presumably require additional resources for the risk assessments and ideally would not rely on utilities conduct the assessments themselves. However, in the absence of new policies and government funding, the PUC is an agency that is already making decisions about climate adaptation. Recognizing the PUC's risk governance role would help explicitly incorporate the electricity sector's adaptation needs into the ratemaking process.

CONCLUSION

The state PUC is one of the most consequential government agencies guiding a utility's investments, and thus a state's energy mix. The PUC decides which costs a utility may recover from its customers, the rate-of-return a utility's shareholders

may earn, and the expenses that qualify for the rate-of-return. Whether or not PUCs characterize their ratemaking decisions as adaptation policy, their actions dictate how utilities prepare for, and respond to, a changing climate. Most state PUCs approach climate risk using a narrow economic lens, focusing on near-term threats that could have direct impacts on electricity rates, system reliability, or the financial viability of the utility. This is not the formula to adapt to climate change while also maintaining an affordable and reliable electricity grid. Recognizing the link between climate risk and the PUC's traditional roles allows commissioners to take a more comprehensive approach to the risks within their direct jurisdiction and help facilitate adaptation responses across multiple agencies.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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