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Precautionary Ratemaking

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ABSTRACT

For more than one hundred years, states have relied on ratemaking to ensure that electric utilities deliver affordable and reliable power to their customers. This process helped keep costs down, but it also produced an electricity system that is a cause of, and vulnerable to, some of the most pressing challenges now facing society: climate change, catastrophic wildfires, extreme storms, and air and water pollution.

This Article argues that risk regulation is an alternate legal foundation for interpreting bedrock principles of ratemaking, such as prudency, reasonableness, least cost, and the public interest. The traditional economic regulator view of ratemaking evaluates these principles in financial terms, generally focusing on near-term rate impacts and the utility's financial viability. This often excludes consideration of options with far lower risk of health and environmental harms if those options would result in higher costs for ratepayers.

Ratemaking does not require public utilities commissions (PUCs) to wait for catastrophic events to occur, or regulations to change, before addressing risk. A state PUC's authority is often quite broad, and courts recognize that each rate case is unique. The discretion granted by statutes and the courts allows PUCs to proactively manage risk without requiring new legislation. PUCs could improve social and environmental outcomes by focusing on a wider range of a ratemaking decision's potential impacts and a longer time frame during which the impacts may occur. A more robust approach to risk management could also help the PUC achieve its traditional mandates of affordability and reliability.

This Article proposes a novel framework—precautionary ratemaking—to unlock the risk governance potential of the PUC. The Article begins with an overview of the ratemaking process and focuses on two guiding principles for a PUC's approach to risk: least cost planning and the public interest. The Article points to the U.S. Supreme Court's 1944 decision in *Federal Power Commission v. Hope Natural Gas* as a turning point that limited PUCs' public interest considerations. The Article then reframes ratemaking as risk governance, demonstrating how the process mitigates, allocates, and creates risk among utilities, ratepayers, and the general public. The discussion explains how these categories relate to electricity rates and therefore fall within the general jurisdiction of a PUC. The Article concludes with a framework for shifting ratemaking from a least cost to a least cost-least risk approach that is rooted in the precautionary principle.

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INTRODUCTION

For more than one hundred years, states have relied on public utilities commissions (PUCs) to ensure that investor-owned electric utilities deliver affordable and reliable power to their customers. Rate regulation by PUCs helped keep costs down, but it also produced an electricity system that is a cause of, and vulnerable to, some of the most pressing challenges now facing society: climate change, catastrophic wildfires, extreme storms, and air and water pollution.

The PUC traditionally views its role as the economic regulator, often distinguishing between the financial interests of ratepayers, utilities, and shareholders on the one hand, and the numerous additional direct and indirect impacts of electricity sector operations on the other.[1] This approach to ratemaking often excludes consideration of options with far lower risks of health and environmental harms if those options would result in higher costs for ratepayers.[2] This Article argues that risk governance is a legally sound alternative interpretation of the foundational principles of ratemaking, including prudency, reasonableness, least cost planning, and the public interest. A broad approach to risk minimization would improve social and environmental outcomes while also improving a PUC's ability to perform its traditional institutional roles.

Recent wildfires in California are visceral examples of the link between ratemaking and risk. The 2018 Camp Fire in California—the deadliest wildfire in the state's history—killed eighty-five people and destroyed more than 18,800 buildings.[3] The fire, caused by one of the major electric utilities in the state, was

1. States generally rely on other agencies to oversee the public health and environmental impacts of the electricity sector.
2. For example, renewable energy plus storage may be more expensive than maintaining an existing coal plant on a purely economic basis, but consideration of other benefits and risk-hedging potential of renewable energy could change the calculus. *See, e.g.*, Catherine Morehouse, *As Puget Sound Energy Moves to Sell Colstrip Share, Critics Say Northwestern Desperate to Keep Coal Plant Online*, UTILITY DIVE (Feb. 26, 2020), https://www.utilitydive.com/news/as-puget-sound-energy-moves-to-sell-colstrip-share-critics-say-northwester/572968 [https://perma.cc/4JJZ-BAL5] (reporting on the controversy regarding a Montana utility's plans to purchase a larger share of an allegedly uneconomic coal-fired power plant).
3. Jeff Daniels, *Officials: Camp Fire, Deadliest in California History, Was Caused by PG&E Electrical Transmission Lines*, CNBC (May 16, 2019, 11:34 AM), https://www.cnbc.com/2019/05/15/officials-camp-fire-deadliest-in-california-history-was-caused-by-pge-electrical-transmission-lines.html [https://perma.cc/AWC3-AG25].

only the latest in a string of utility-caused fires in the state.[4] The Camp Fire was a result of corporate neglect, a changing climate, population growth, aging infrastructure, and historic reliance on centralized power grids that depend upon high voltage transmission lines to deliver electricity to remote locations.[5] Ratemaking decisions by the California Public Utilities Commission (CPUC) dictate a utility's response. For example, Pacific Gas & Electric Company (PG&E) is a rate-regulated monopoly utility, and it may not charge ratepayers for new investments without the CPUC's approval. California's utilities commissioners are therefore not solely economic regulators who set rates and oversee electricity service—they are also risk regulators.[6]

4. CAL. PUB. UTIL. COMM'N, SAFETY & ENF'T DIV., INCIDENT INVESTIGATION REPORT FOR INCIDENT NO. E20181108-01 (Nov. 8, 2019), https://www.courthousenews.com/wp-content/uploads/2019/12/CPUC-CampFireReport_compressed.pdf [https://perma.cc/5GGB-9QJ9] [hereinafter CPUC Camp Fire Incident Report] (concluding that Pacific Gas and Electric caused the Camp Fire). California's electric utilities caused over 2000 fire "incidents" between 2014–2017. Over 1500 of the incidents were linked to PG&E. Michael Finch II, *CA Utilities Cause Hundreds of Fires Every Year. Here's Where They Were and How Many*, SACRAMENTO BEE (Nov. 20, 2018, 3:00 AM), https://www.sacbee.com/news/california/fires/article221924560.html [https://perma.cc/UXV8-SHYF].

5. CAL. PUB. UTIL. COMM'N, SAFETY & ENF'T DIV., MOTION OF THE SAFETY AND ENFORCEMENT DIVISION TO EXPAND THE PROCEEDING SCOPE TO INCLUDE THE 2018 CAMP FIRE, 34 (2019), https://www.cpuc.ca.gov/-/media/cpuc-website/industries-and-topics/documents/wildfire/staff-investigations/i1906015-sed-motion-to-expand-the-proceeding-scope-to-the-2018-camp-fire_.pdf?sc_lang=en&hash=2D194F22DC4D5A8F90B35478E61EB021 [https://perma.cc/9F5N-WHMC]; Dale Kasler, *PG&E Failed to Inspect Tower That Sparked Deadly Camp Fire, State Investigators Say*, SACRAMENTO BEE (Dec. 3, 2019, 9:46 AM), https://www.sacbee.com/news/california/fires/article237996959.html [https://perma.cc/32P9-X6W7] (quoting a PG&E spokesperson stating "We remain deeply sorry about the role our equipment had in this tragedy, and we apologize to all those impacted by the devastating Camp Fire."); SB-45 Wildfire Prevention, Safe Drinking Water, Drought Preparation, and Flood Protection Bond Act of 2020, Pub. Res. § 47.80201(a), ("California's changing climate creates increased risks of catastrophic wildfire, drought, floods, severe heat events, intense rain events, and sea level rise . . . ."); Robinson Meyer, *California's Wildfires Are 500 Percent Larger Due to Climate Change*, ATLANTIC (July 16, 2019), https://www.theatlantic.com/science/archive/2019/07/climate-change-500-percent-increase-california-wildfires/594016 [https://perma.cc/T32L-VYJW]; U.S. DEP'T OF ENERGY, TRANSFORMING U.S. ENERGY INFRASTRUCTURES IN A TIME OF RAPID CHANGE: THE FIRST INSTALLMENT OF THE QUADRENNIAL ENERGY REVIEW S-6 (2015), https://www.energy.gov/sites/prod/files/2015/08/f25/QER%20Summary%20for%20Policymakers%20April%202015.pdf [https://perma.cc/W56C-GY5H] ("By far the most important environmental factor affecting [electricity transmission, storage, and distribution] infrastructure needs now and going forward is global climate change.").

6. *See, e.g.*, PA. PUB. UTIL. COMM'N, STATEMENT OF CHAIRMAN GLADYS M. BROWN (2018), http://www.puc.pa.gov/pcdocs/1567104.pdf [https://perma.cc/9GTM-8GLG] ("As economic regulators, it is the Commission's responsibility to ensure that utility rates are just and reasonable."); *see also* WILLIAM STEINHURST, THE ELECTRIC INDUSTRY AT A GLANCE 34–37

Electric utilities are private enterprises.[7] They invest where they can earn profits. If society expects rate-regulated monopoly utilities to make different choices, the ratemaking process must also change.

Emphasizing low cost investments rather than coordination and cooperation among state agencies to achieve multiple societal goals has also resulted in one agency—the PUC—making decisions that increase pollution, thereby requiring another agency—the state environmental regulator—to enact rules limiting the pollution and often driving up the cost of electricity generation.[8] Restricting utility planning to current regulatory requirements and technology costs may unnecessarily lock in risks and costs during the thirty- to fifty-year operating lives of new power plants. This is not the formula to guide the electric power sector to an affordable, reliable, and clean future.

Legal scholarship generally approaches the study of economic ratemaking and the study of risk regulation as separate doctrinal areas.[9] Analysis of electric utility governance focuses on institutional roles,[10] markets and competition,[11]

(2011), https://www.synapse-energy.com/sites/default/files/SynapseReport.2011-01.0.Elec-Industry-Overview.10-076.pdf [https://perma.cc/X5KD-JU6U] (explaining "economic regulatory jurisdiction" in the U.S. electricity sector).

7. Some states rely on competitive electricity markets, rather than vertically integrated public utilities, to alleviate financial risk to ratepayers and allow new market entrants. Competition may eliminate some forms of risk but others, such as reliability risks and public health risks, still exist. *See, e.g.* Kathryne Cleary, Karen Palmer & Todd Aagaard, *FERC 101: Electricity Regulation and the Federal Energy Regulatory Commission*, RES. FOR THE FUTURE (Aug. 12, 2021), https://www.rff.org/publications/explainers/ferc-101-electricity-regulation-and-the-federal-energy-regulatory-commission [https://perma.cc/Q5ZZ-TBPS] (summarizing regulation of wholesale electricity markets).

8. *See* Jonas J. Monast & Sarah K. Adair, *A Triple Bottom Line for Electric Utility Regulation: Aligning State-Level Energy, Environmental, and Consumer Protection Goals*, 38 COLUM. J. ENV'T L. 1, 10–19 (2013) (comparing roles of the PUC and state environmental regulators).

9. *See, e.g.*, Peter Huber, *The Old-New Division in Risk Regulation*, 69 VA. L. REV. 1025, 1025 (1983) (distinguishing risk regulation from "rival regulation of natural monopolies").

10. *See* Danny Cullenward & Shelley Welton, *The Quiet Undoing: How Regional Electricity Market Reforms Threaten State Clean Energy Goals*, 36 YALE J. REG. 106 (2018); Amy L. Stein, *Regulating Reliability*, 54 HOUS. L. REV. 1191 (2017); Joel B. Eisen, *Who Regulates the Smart Grid?: FERC's Authority Over Demand Response Compensation in Wholesale Electricity Markets*, 4 SAN DIEGO J. CLIMATE & ENERGY L. 69 (2013).

11. *See* Bethany A. Davis Noll & Burcin Unel, *Markets, Externalities, and the Federal Power Act: The Federal Energy Regulatory Commission's Authority to Price Carbon Dioxide Emissions*, 27 N.Y.U. ENV'T L.J. 1 (2019); Jonas J. Monast, *Electricity Competition and the Public Good: Rethinking Markets and Monopolies*, 90 U. COLO. L. REV. 667 (2019); Bernard S. Black & Richard J. Pierce, Jr., *The Choice Between Markets and Central Planning in Regulating the U.S. Electricity Industry*, 93 COLUM. L. REV. 1339 (1993).

federalism,[12] and the intersection of energy, environmental, and social goals.[13] Risk governance scholarship tends to focus on cost-benefit analysis,[14] risk tradeoffs,[15] the precautionary principle,[16] and risk mitigation in specific regulatory contexts.[17]

This Article bridges the gap. In particular, this Article explains how ratemaking and the underlying focus on least-cost planning creates costs and risks that are then allocated among utilities, ratepayers, and the general public. It then explains how a precautionary, least cost-least risk approach to ratemaking would improve social, environmental, and economic outcomes. Energy options that do not require fuels, do not pollute, allow smaller scale investments, or have faster construction timelines—risk mitigation characteristics of many renewable energy, energy storage, and energy efficiency projects—would often emerge as the

12. *See* Alexandra B. Klass & Jim Rossi, *Reconstituting the Federalism Battle in Energy Transportation*, 41 HARV. ENV'T L. REV. 423 (2017); William W. Buzbee, *Federalism Hedging, Entrenchment, and the Climate Challenge*, 2017 WIS. L. REV. 1037; Jim Rossi, *The Brave New Path of Energy Federalism*, 95 TEX. L. REV. 399 (2016); Felix Mormann, *Clean Energy Federalism*, 67 FLA. L. REV. 1621 (2015).

13. *See* Felix Mormann, *Clean Energy Equity*, 2019 UTAH L. REV. 335; Shelley Welton, *Electricity Markets and the Social Project of Decarbonization*, 118 COLUM. L. REV. 1067 (2018); Ari Peskoe, *Easing Jurisdictional Tensions by Integrating Public Policy in Wholesale Electricity Markets*, 38 ENERGY L.J. 1, 3–4 (2017); Jody Freeman, *The Uncomfortable Convergence of Energy and Environmental Law*, 41 HARV. ENV'T L. REV. 339, 346 (2017); William Boyd, *Public Utility and the Low-Carbon Future*, 61 UCLA L. REV. 1614 (2014); Lincoln Davies, *Alternative Energy and the Energy-Environment Disconnect*, 46 IDAHO L. REV. 473 (2010).

14. *See* Sidney A. Shapiro & Christopher H. Schroeder, *Beyond Cost-Benefit Analysis: A Pragmatic Reorientation*, 32 HARV. ENV'T L. REV. 433 (2008); Lisa Heinzerling, *Regulatory Costs of Mythic Proportions*, 107 YALE L.J. 1981 (1998).

15. *See* Samuel J. Rascoff & Richard L. Revesz, *The Biases of Risk Tradeoff Analysis: Towards Parity in Environmental and Health-and-Safety Regulation*, 69 U. CHI. L. REV. 1763 (2002); Cass R. Sunstein, *Health-Health Tradeoffs*, 63 U. CHI. L. REV. 1533 (1996); RISK VERSUS RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT (John D. Graham & Jonathan Baert Wiener eds., 1995); Frank B. Cross, *When Environmental Regulations Kill: The Role of Health/Health Analysis*, 22 ECOLOGY L.Q. 729 (1995).

16. *See* Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841 (2006); Frank B. Cross, *Paradoxical Perils of the Precautionary Principle*, 53 WASH. & LEE L. REV. 851 (1996).

17. *See* Kristin Johnson, Steven A. Ramirez & Cary Martin Shelby, *Diversifying to Mitigate Risk: Can Dodd-Frank Section 342 Help Stabilize the Financial Sector?*, 73 WASH. & LEE L. REV. 1795 (2016); Timothy F. Malloy, *Disrupting Conventional Policy: The Three Faces of Nanotechnology*, 28 UCLA J. ENV'T L. & POL'Y 1 (2010); Nan D. Hunter, *Risk Governance and Deliberative Democracy in Health Care*, 97 GEO. L.J. 1, abstract (2008) (arguing that "risk-centered governance is the best theoretical paradigm for understanding health law and the health care system" (emphasis omitted)); Cass R. Sunstein, *Regulating Risks After* ATA, 2001 SUP. CT. REV. 1; Samuel R. Bagenstos, *The Americans With Disabilities Act as Risk Regulation*, 101 COLUM. L. REV. 1479 (2001).

preferred choices.[18] This alternative framework would also enhance a PUC's ability to achieve its mandates of affordability and reliability.

The Article begins with an overview of the ratemaking process and focuses on two foundational principles that guide a PUC's approach to risk: least cost planning and the public interest. The Article points to the U.S. Supreme Court's 1944 *Federal Power Commission v. Hope Natural Gas*[19] decision as a turning point that limited the state PUC's public interest considerations. After *Hope Natural Gas*, courts largely defer to commissions' ratemaking choices. Without courts weighing in on other public interests affected by ratemaking, a PUC's near-term focus on least cost planning takes on an outsized role and limits consideration of broader welfare impacts.

The Article then presents ratemaking as risk governance, demonstrating how the process mitigates, allocates, and creates risk among utilities, ratepayers, and the general public. Critically for the central argument in this Article, the discussion demonstrates how these categories of risk relate to electricity rates and therefore fall within the general jurisdiction of a PUC.

The Article concludes with a framework for expanding the institutional role of the PUC. This framework is based on a broader least cost-least risk approach that builds upon the precautionary principle. This approach would first identify the broad range of risks impacting the electric power sector, including the environmental and public health risks created by the sector. It would then identify pathways that are most likely to reduce economic, social, and environmental risks without jeopardizing the core ratemaking principles of consumer protection for ratepayers and financial stability for the regulated utility.

I. LIMITATIONS OF THE "ECONOMIC REGULATOR" VIEW OF RATEMAKING

The early vision of the public utility sought to harness the private sector and state ratemaking to expand critical services to the public.[20] The law evolved with a dual focus—protecting consumers from market power abuses by the monopoly utility while ensuring that rates are not confiscatory and investors have opportunities to earn reasonable returns.[21] Society's interests in energy

18. *See* David Hoppock, Dalia Patino Echeverri & Sarah Adair, *Assessing the Risk of Utility Investments in a Least-Cost-Planning Framework* (Duke U., Working Paper No. NI WP 13-07, 2013) ("review[ing] risk metrics that utilities and utility regulators can use to evaluate investment options . . . in a least-cost-planning framework").
19. 320 U.S. 591 (1944).
20. *See* Boyd, *supra* note 13, at 1616, 1638 (discussing the origins of the public utility model).
21. Bluefield Waterworks & Improvement Co. v. Pub. Serv. Comm'n, 262 U.S. 679, 691 (1923).

production and consumption have evolved in the ensuing years, but the PUC's view of its obligations to address these interests too often remains static. Rather than expanding the factors PUCs consider during ratemaking, many commissions focus primarily on economic factors as they relate to ratepayers' bills and utilities' returns.

This limited view has its roots in the origins of ratemaking.[22] Federal economic regulation began in 1887 with the creation of the Interstate Commerce Commission (ICC) to oversee interstate rail transportation.[23] Rail companies operating in markets without competitors could exert market power and charge exorbitant prices.[24] In addition to controlling access, rail companies were also charging farmers and merchants widely divergent rates in uncompetitive rail markets.[25] Congress responded by requiring the ICC to ensure that railroad companies' rates for passenger travel and freight were just and reasonable.[26]

State and federal policymakers subsequently applied rate regulation, including the "just and reasonable" standard, to other sectors (including

22. The government's authority to impose economic limits on a private enterprise is rooted in the U.S. Supreme Court's holding in the 1876 case *Munn v. Illinois*, where a small group of companies operating grain warehouses in Illinois conspired to set prices. 94 U.S. 113 (1876). The collective market power of the warehouses allowed these companies to essentially control grain markets where the "vast productions 'of seven or eight great States of the West' must pass on the way 'to four or five of the States on the seashore.'" *Id.* at 131. The Illinois legislature responded by setting maximum charges for storing and handling grain. *Id.* at 117. The U.S. Supreme Court upheld the state law, concluding that economic regulation is not automatically a taking under the Fifth or Fourteenth Amendments when the private firm's actions are "clothed with a public interest." *Id.* at 125–26.

23. Interstate Commerce Act, ch. 104, 24 Stat. 379 (1887) (current version at 49 U.S.C. § 1).

24. *See, e.g.*, Paul Stephen Dempsey, *The Rise and Fall of the Interstate Commerce Commission: The Tortuous Path From Regulation to Deregulation of America's Infrastructure*, 95 MARQ. L. REV. 1152, 1155 (2012).

25. Paul Stephen Dempsey, *Transportation: A Legal History*, 30 TRANSP. L.J. 235, 254 (2003) ("Often, a farmer located along an intermediate point served by only a single railroad would find the price he was charged to get his grain to market was higher than that shipped by another, even though the other farmer's grain would be moved a longer distance over the same line. Hence, pricing became highly discriminatory.").

26. Interstate Commerce Act, 49 U.S.C. § 1(5)(a) (1988) ("All charges made for any service rendered . . . shall be just and reasonable, and every unjust and unreasonable charge for such service or any part thereof is prohibited and declared to be unlawful."). Other risks were well known, such as the risk that sparks from rail lines would cause fires. Landowners harmed by fires caused by trains had to pursue tort remedies. *See, e.g.*, Phila. & Reading R.R. v. Hendrickson, 80 Pa. 182, 184 (1876) (presenting a suit for damages after sparks from a train caused a nearby barn to burn down); Kellogg v. Chicago & Nw. Ry., 26 Wis. 223, 230 (1870) (addressing a negligence claim after embers from a train engine ignited weeds along the rail right-of-way).

electricity) providing essential public services[27] where high capital costs created barriers to entry and there was a risk of market power abuses due to the lack of competition.[28] Many of these sectors now rely on competition rather than ratemaking to limit market power, but vertically integrated, rate-regulated electric utilities still operate in a majority of states, including many states that have opted into competitive wholesale electricity markets.[29] These utilities generate power, own transmission and distribution lines, and sell power to end-users.[30] In the minority of states where the electric utilities do not own power plants, monopoly utilities still operate local distribution grids and many are responsible for procuring the electricity required by their customers.[31] Ratemaking will therefore play a direct role in shaping the sector's evolution.

27. *See, e.g.,* FELIX FRANKFURTER, THE PUBLIC AND ITS GOVERNMENT 81 (1930) ("No task more profoundly tests the capacity of our government, both in nation and state, than its share in securing for society those essential services which are furnished by public utilities."). Justice Frankfurter argued that the services provided by public utilities are "as truly public services as the traditional governmental functions of police and justice." *Id.*

28. *See, e.g.,* Richard D. Cudahy, *The FERC's Policy on Electric Mergers: A Bit of Perspective*, 18 ENERGY L.J. 113, 128 (1997) ("Only one industry is more capital-intensive than railroads, and that is electric generation."). *See generally* Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323 (1998). State regulation treated electric utilities as natural monopolies—capital-intensive sectors where competition would cause prices to increase rather than serve as a check on the prices a firm could charge. *Id.* Multiple companies investing in their own electricity grids, for example, would be less efficient than relying on a single company to do so. *Id.* The solution was to grant the utility a monopoly in an exclusive service territory. *Id.* In exchange, the utility would be subject to rate regulation by a state utilities commission. *Id.* Other examples of rate-regulated sectors have included airlines, buses, trucks, telephone service, natural gas pipelines, and water utilities. *Id.*

29. U.S. ENERGY INFO. ADMIN., TODAY IN ENERGY: INVESTOR-OWNED UTILITIES SERVED 72% OF U.S. ELECTRICITY CUSTOMERS IN 2017 (2019), https://www.eia.gov/todayinenergy/detail.php?id=40913 [https://perma.cc/8ZVE-4QCY].

30. *Green Power Partnership: U.S. Electricity Grid & Markets*, U.S. EPA, https://19january2021snapshot.epa.gov/greenpower/us-electricity-grid-markets_.html [https://perma.cc/B9T6-NRZX] (last updated Jan. 19, 2021).

31. *See, e.g.*, Implementation of Act 129 of Oct. 15, 2008, No. L-2009-2095604 (Pa. Pub. Util. Comm'n Sept. 22, 2011), 2011 WL 4826268. Here, the Pennsylvania PUC determined that:

> Historically, the local electric utility company was responsible for generating, purchasing and delivering electricity to the customers' premises. However, the [Competition Act] of December 3, 1996 . . . required electric distribution companies (EDCs) to unbundle transmission, distribution and generation rates for retail customers. The Competition Act deregulated electricity generation and provided all customers in Pennsylvania with the opportunity to choose their electricity generation supplier (EGS). . . . The EDC is responsible for delivering the electricity to those customers who choose to buy from an EGS. Additionally, the EDC is responsible for both acquiring and delivering electricity for those customers who do not shop or buy their electricity from an EGS or where an EGS fails to provide the promised electricity.

Subpart I.A begins with an overview of the traditional ratemaking model for electric utilities to provide a foundation for evaluating the goals and limitations of ratemaking. It then focuses on the public interest role of the PUC and explains how the 1944 U.S. Supreme Court's decision, *Federal Power Commission v. Hope Natural Gas*, endorsed a narrow view of the public interest that endures today. It concludes by demonstrating how *Hope Natural Gas* elevated the role of cost impacts in ratemaking proceedings and how a focus on least cost planning contributes to social and environmental risks.

A. Traditional Ratemaking for Electric Utilities

State laws grant monopoly utilities exclusive service territories and prohibit retail sales by other companies.[32] In exchange for the grant of monopoly power, the utility is subject to rate regulation by the state PUC.[33]

To strike this balance, commissions identify the cost of operating a utility's system and divide that cost among the different types of customers—residential, commercial, and industrial.[34] Rates may not be confiscatory.[35] They must allow a utility to earn enough revenue to keep its system operational, attract capital to meet future electricity demand, service debt, and allow investors the opportunity to earn reasonable returns.[36] Rates must also allow the utility to comply with

Id. See also Severin Borenstein & James Bushnell, *The U.S. Electricity Industry After 20 Years of Restructuring*, 7 ANN. REV. ECON. 437, 439 (2015).

32. *See, e.g.,* State *ex rel.* Util. Comm'n v. N.C. Waste Awareness & Reduction Network, 255 N.C. App. 613, 618 (2017) ("Duke Energy has been granted an exclusive right to provide electricity in return for compensation within its designated territory and with that right comes the obligation to serve all customers at rates and service requirements established by the Commission."), *aff'd* 371 N.C. 109 (2018); KY. REV. STAT. ANN. § 278.018 (West 2012) ("Except as otherwise provided herein, each retail electric supplier shall have the exclusive right to furnish retail electric service to all electric-consuming facilities located within its certified territory, and shall not furnish, make available, render or extend its retail electric service to a consumer for use in electric-consuming facilities located within the certified territory of another retail electric supplier . . . .").

33. *See, e.g.*, *N.C. Waste Awareness & Reduction Network,* 255 N.C. App. at 618.

34. *See* JONATHAN A. LESSER & LEONARDO R. GIACCHINO, FUNDAMENTALS OF ENERGY REGULATION 78–82 (2d ed. 2013).

35. *See* Duquesne Light Co. v. Barasch, 488 U.S. 299, 307 (1989) ("The guiding principle has been that the Constitution protects utilities from being limited to a charge for their property serving the public which is so 'unjust' as to be confiscatory.").

36. *See* Bluefield Waterworks & Improvement Co. v. Pub. Serv. Comm'n, 262 U.S. 679, 692–93 (1923). The Court held that:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the

applicable laws, such as renewable energy mandates and environmental regulations. Commissions may also consider additional factors, such as the economic development impacts of a rate decision or general goals such as maintaining a diverse fuel mix to mitigate the impacts of price volatility for a particular fuel.[37]

Ratemaking is a complex economic and political balancing act.[38] The ratepayer has an interest in affordable electricity rates and reliable, nondiscriminatory service.[39] Residential, commercial, and industrial customers may have different expectations about the energy mix and the cost of electricity.[40] The utility has an interest in continuing as a viable business that provides reliable power, attracts private capital, and adjusts to new market conditions and regulatory requirements. The investor seeks a reasonable return on her investments, with reasonableness determined by comparisons to similarly situated businesses.[41] The lender expects to recoup the principal and interest associated with a loan.

> country on investments in other business undertakings which are attended by corresponding, risks and uncertainties . . . . The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.

Id.

37. *See e.g.*, Miss. Power Co., EC-120-0097-00 (Miss. Pub. Serv. Comm'n 2012), 2012 WL 1484068, at *7 (discussing "the strategic interest of fuel diversity").

38. FRANKFURTER, *supra* note 27, at 81 (explaining that, prior to his appointment to the U.S. Supreme Court, Justice Frankfurter—then Professor Frankfurter—argued that "[n]o task more profoundly tests the capacity of our government, both in nation and state, than its share in securing for society those essential services which are furnished by public utilities.").

39. *See* Jim Rossi, *The Common Law "Duty to Serve" and Protection of Consumers in an Age of Competitive Retail Public Utility Restructuring*, 51 VAND. L. REV. 1233, 1260 (1998) (discussing the common law origins of the electric utility's duty to serve).

40. These customer classes pay different rates for electricity. *See Electric Power Monthly: Table 5.6.A. Average Price of Electricity to Ultimate Customers by End-Use Sector*, U.S. Energy Info. Admin., https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a [https://perma.cc/M8KG-SFZQ].

41. *See, e.g.*, State *ex rel.* Util. Comm'n v. Gen. Tel. Co., 281 N.C. 318, 337–38 (1972). Here, the Supreme Court of North Carolina held:

> [T]o attract capital, a utility does not need to charge, and it is not entitled to charge, for its service rates which will make its shares, or its bonds, attractive to investors who are willing to risk substantial loss of principal in return for the possibility of abnormally high earnings. . . . [where the utility], having a legal monopoly in an essential service, offers its investors a minimal risk of loss of principal.

Id. The U.S. Supreme Court established the principle of using similarly situated enterprises to determine returns in ratemaking proceedings in 1923. *See* Bluefield Waterworks &

A PUC attempts to set rates that reflect outcomes in a competitive marketplace.[42] Unlike most private firms, however, ratemaking limits the competitive pressures that may lead the utility to adjust business practices to maintain its customer base.[43] The process also distorts a utility's ability to respond to shifting shareholder expectations.[44]

Utilities are private enterprises and seek to maximize profits. Executives make investment decisions based on the incentives created by ratemaking. If a commission concludes that a new power plant or other capital investment is prudent, then the expenditure is included in a utility's rate base.[45] Costs included in the rate base are eligible for the PUC-authorized rate of return.[46] Utilities also recover variable costs, such as the cost of labor and fuel, but variable costs are not eligible for the rate of return. A utility, therefore, has a financial incentive to prioritize investments in infrastructure and seek approval for a more expensive option than is necessary to meet need.[47] Utilities also have an incentive to overbuild generation capacity because doing so increases the rate base and thus the opportunity for higher shareholder returns. Even recognizing this incentive, PUCs may trust a utility's projections of high electricity demand because there is a risk of brownouts or blackouts if the projections are correct and the utility does not

Improvement Co. v. Pub. Serv. Comm'n, 262 U.S. 679, 692–93 (1923); *see* Duke Energy Carolinas, LLC, No. E-7 (N.C. Utils. Comm'n Oct. 23, 2013), 2013 WL 5783801, at *17 (citing *Bluefield Waterworks* and Fed. Power Comm'n v. Hope Natural Gas, 320 U.S. 591 (1944), as "longstanding decisions" interpreting the constitutional requirements of ratemaking).

42. *See, e.g.*, Nw. Energy, No. 7199D (Mont. Pub. Serv. Comm'n Dec. 7, 2012), 2012 WL 7008279 (Kavulla, Comm., concurring) ("Regulation is a substitute for competition in certain monopoly industries, including the electric utility sector. That is the core premise of what economic regulators of monopolies such as this Commission do.").

43. *See* Richard J. Pierce, Jr., *A Proposal to Deregulate the Market for Bulk Power*, 72 VA. L. REV. 1183, 1195 (1986).

44. David Roberts, *Power Utilities Are Built for the 20th Century. That's Why They're Flailing in the 21st.*, VOX (Sept. 9, 2015, 9:10 AM), https://www.vox.com/2015/9/9/9287719/utilities-monopoly [https://perma.cc/Z4SC-88XA].

45. Rate base is "[t]he value of property upon which a utility is permitted to earn a specified rate of return as established by a regulatory authority." *Glossary: Rate Base*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/tools/glossary/?id=electricity [https://perma.cc/ZB7H-V9Y6].

46. *See generally* JIM LAZAR, ELECTRICITY REGULATION IN THE U.S. (2nd ed. 2016), https://www.raponline.org/knowledge-center/electricity-regulation-in-the-us-a-guide-2 [https://perma.cc/YET9-AK42].

47. *See* Richard J. Pierce, Jr., *Completing the Process of Restructuring the Electricity Market*, 40 WAKE FOREST L. REV. 451, 457 (2005); Harvey Averch & Leland L. Johnson, *Behavior of the Firm Under Regulatory Constraint*, 52 AM. ECON. REV. 1052, 1068 (1962).

invest accordingly.[48] This process kept electricity costs down in most states. As described in Part II, the traditional approach to ratemaking has also contributed to numerous financial, health, and environmental risks now facing society.

B. Hope Natural Gas and the PUC's Diminished Public Interest Role

PUCs have wide discretion when they apply these principles in specific proceedings, and courts are generally deferential to commission decisions.[49] This deference is the result of the U.S. Supreme Court's 1944 ruling in *Federal Power Commission v. Hope Natural Gas* and the case is an important step in understanding how PUCs view risk mitigation. Prior to *Hope Natural Gas*, the *Smyth v. Ames*[50] fair value rule stated that regulated industries were constitutionally entitled to earn a fair return on their investments. According to the *Smyth* Court, commissions were required to consider:

> [O]riginal cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as maybe just and right in each case . . . What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth.[51]

48. *See, e.g.*, Sammy Roth, *California Blackouts Are Public Utilities Commission's Fault, Grid Operator Says*, L.A. TIMES (Aug. 17, 2020, 9:13 PM), https://www.latimes.com/environment/story/2020-08-17/public-utilities-commission-to-blame-for-blackouts-caiso-says#:~:text=California%20blackouts%20are%20Public%20Utilities%20Commission's%20fault%2C%20grid%20operator%20says&text=It's%20a%20challenge%20that%20will,emissions%2Dfree%20power%20by%202045 [https://perma.cc/E5FK-HK2E].

49. *Id.*; *see also* George Blum, Karl Oakes & Eric C. Surette, *Rates and RateMaking*, 73B C.J.S. PUB. UTILS. § 26 (2021); Jack K. Levin & Eric C. Surette, *Reasonableness—Evidence and Findings*, 29 C.J.S. ELEC. § 71 (2021) ("Unless it is provided otherwise by an applicable statute, the party attacking rates for electricity has the burden of proving that they are unreasonable or confiscatory. Rates charged for electricity are generally presumed to be reasonable.").

50. 169 U.S. 466 (1898).

51. *Smyth*, 169 U.S. at 547.

Commissions struggled to apply these vague standards and judges frequently second-guessed commission decisions.[52] *Hope Natural Gas* significantly altered the role of the courts in the ratemaking process. Rather than reevaluating the Federal Power Commission's judgment calls, the *Hope* Court established an "end results test" that focused on the outcome of a rate case.[53] According to the majority, if the ratemaking process produces a just and reasonable rate, the court's inquiry is at an end.[54] The holding continues to guide ratemaking at the federal and state levels. Many state utility laws also require just and reasonable rates and courts have applied the *Hope Natural Gas* end results test to state PUC decisions.[55]

Judges and scholars often cite *Hope Natural Gas* for its discussion of the judiciary's role in ratemaking and the interests of investors.[56] Less recognized, but equally important for questions about the social and environmental impacts of ratemaking, is the debate over rate regulators' public interest role. Here, the *Hope* Court overcorrected. The majority may have overturned the unworkable requirements of *Smyth*, but ending judicial oversight of the process by which the

52. Boyd, *supra* note 13, at 1644 ("By advancing a constitutional duty to determine the fair value of a utility's assets as a basis for setting rates, *Smyth v. Ames* put the courts, rather than legislatures and regulatory commissions, at the center of the effort to establish rates."); *see also* Missouri *ex rel.* Sw. Bell Tel. Co. v. Pub. Serv. Comm'n, 262 U.S. 276, 290 (1923) (Brandeis, J., dissenting) (referring to the "so-called rule of *Smyth v. Ames*" as "legally and economically unsound").

53. Fed. Power Comm'n v. Hope Nat. Gas, 320 U.S. 591, 602–03 ("If the total effect of the rate order cannot be said to be unjust and unreasonable, judicial inquiry under the Act is at an end. . . . [W]e are of the view that the end result in this case cannot be condemned under the Act as unjust and unreasonable from the investor or company viewpoint.")

54. *Id.*

55. *See, e.g.*, GA. CODE ANN. § 46–2-23 (West 2012) ("The commission shall have exclusive power to determine what are just and reasonable rates and charges to be made by any person, firm, or corporation subject to its jurisdiction."); FLA. STAT. ANN. § 366.06 (West 2018) ("[T]he commission shall have the authority to determine and fix fair, just, and reasonable rates that may be requested, demanded, charged, or collected by any public utility for its service."); People's Org. for Wash. Energy Res. v. Wash. Util. & Transp. Comm'n, 104 Wash. 2d 798, 812 (1985) (explaining that *Hope Natural Gas* continues to "provide guidance in the judicial review of rate cases; and it remains the law that courts are not at liberty to substitute their judgment for that of the Commission").

56. *See, e.g.*, Jim Chen, *The Death of the Regulatory Compact: Adjusting Prices and Expectations in the Law of Regulated Industries*, 67 OHIO ST. L.J. 1265, 1270 (2006) ("*Hope Natural Gas* counseled judges to defer to legislative and administrative framers of economic policy."); Richard J. Pierce, Jr., *Public Utility Regulatory Takings: Should the Judiciary Attempt to Police the Political Institutions?*, 77 Geo. L.J. 2031, 2032 (1989) ("[*Hope*] defined the interests of investors in the obvious manner—they seek a return on their investment commensurate with the associated risks—but the Court did not define the interests of consumers or suggest how the interests of the two groups should be reconciled.").

Federal Power Commission arrived at a rate also allowed rate regulators to define for themselves the scope of the public interest.[57] For most PUCs, the primary public interest principles in ratemaking are affordability, reliability, nondiscriminatory access, and financial viability of the utility—but it need not be so limited.[58] The dissenting opinions of Justices Jackson and Frankfurter in *Hope Natural Gas* point to a broader understanding of the public interest. Jackson focused on the Federal Power Commission's failure to prioritize the most socially beneficial uses of natural gas:[59]

> Utilization of natural gas of highest social as well as economic return is domestic use for cooking and water heating, followed closely by use for space heating in homes. This is the true public utility aspect of the enterprise, and its preservation should be the first concern of regulation. Gas does the family cooking cheaper than any other fuel. But its advantages do not end with dollars and cents cost. It is delivered without interruption at the meter as needed and is paid for after it is used. No money is tied up in a supply, and no space is used for storage. It requires no handling, creates no dust, and leaves no ash. It responds to thermostatic control. It ignites easily and immediately develops its maximum heating capacity. These incidental advantages make domestic life more liveable [sic]. . . . Hope is responsible for discrimination as exists in favor of these few industrial consumers. It controls both the resale price and use of industrial gas by virtue of the very interstate sales contracts over which the Commission is exercising its jurisdiction.[60]

57. *See, e.g.*, City of Boulder v. Colo. Pub. Util. Comm'n, 996 P.2d 1270, 1277 (Colo. 2000); *see also* Sierra Club v. Brown, 243 So. 3d 903, 910 (Fla. 2018) (concluding that "determination of what is in the public interest rests exclusively with the Commission" (quoting Citizens of State v. Fla. Pub. Serv. Comm'n, 146 So. 3d 1143, 1173 (Fla. 2014))); *see also* Boyd, *supra* note 13, at 1636–51 (discussing the public interest role of public utilities).

58. *City of Boulder*, 996 P.2d at 1277 ("The PUC has a general responsibility to protect the public interest regarding utility rates and practices. In fulfilling that function . . . the PUC has broadly based authority to do whatever it deems necessary to accomplish the legislative functions delegated to it." (quoting City of Montrose v. Pub. Utils. Comm'n, 629 P.2d 619, 624 (Colo. 1981))); *see generally* LAZAR, *supra* note 46 (providing an overview of ratemaking in the public interest).

59. John Bauer, *The Establishment and Administration of a "Prudent Investment" Rate Base*, 53 YALE L.J. 495, 513 (1944).

60. Fed. Power Comm'n v. Hope Nat. Gas, 320 U.S. 591, 634–35, 641 (1944) (Jackson, J., dissenting).

Jackson was therefore concerned about the social implications of the ratemaking decision—the potential suboptimal use of natural gas—in addition to the direct economic impacts.[61]

Frankfurter endorsed Jackson's arguments[62] but drafted a separate dissent that took issue with the narrowing of the Courts' role and the relationship between public utilities and society.[63] As Frankfurter argued:

> [The] very foundation [of the Natural Gas Act's "just and reasonable" requirement] is the "public interest", and the public interest is a texture of multiple strands. It includes more than contemporary investors and contemporary consumers. The needs to be served are not restricted to immediacy, and social as well as economic costs must be counted.[64]
>
> . . .
>
> The objection to the Commission's action is not that the rates it granted were too low but that the range of its vision was too narrow. And since the issues before the Commission involved no less than the total public interest, the proceedings before it should not be judged by narrow conceptions of common law pleading.[65]

These dissents reflect the early vision of the rate-regulated public utility as a private enterprise in the service of society.[66]

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61. Bauer, *supra* note 59, at 513 ("The Jackson opinion is apparently unique in the annals of court decisions and opinions, because Mr. Justice Jackson considers the basic matters of broad public interest as well as direct legal issues.").
62. *Id.* at 628.
63. Justice Frankfurter stated that:
    > For our society the needs that are met by public utilities are as truly public services as the traditional governmental functions of police and justice. They are not less so when these services are rendered by private enterprise under governmental regulation. Who ultimately determines the ways of regulation, is the decisive aspect in the public supervision of privately-owned utilities.

    Hope Nat. Gas, 320 U.S. at 625 (1944) (Frankfurter, J., dissenting).
64. *Id.* at 627. This reference to social costs precedes the contemporary use of the term, but indicates that there is a social dimension of the public's interest in the ratemaking process.
65. *Id.*
66. Boyd, *supra* note 13, at 1616, 1638, 1643 ("[Rate regulation] was a way to socialize the costs of building and operating a centralized electricity grid while protecting consumers from the potential abuses associated with natural monopoly. In return for an exclusive franchise, the right of eminent domain, and an ability to sell electricity at reasonable rates, electric utilities would provide reliable, universal service and forgo some of the profits that might be attainable in the absence of regulation.").

There have been countless references to the PUC's public interest role since *Hope Natural Gas*, but courts and PUCs rarely define the term.[67] Rather than directly endorse an expansive scope of public interests in electricity sector oversight, the *Hope Natural Gas* end results test elevates cost minimization as the primary measure of the public interest, often to the detriment of other social considerations.[68] PUCs are skeptical when a utility proposes a project with higher costs than other options because the ratemaking formula rewards capital investments. PUCs use a least cost mandate to protect against this profit maximizing incentive.[69]

There are compelling reasons to use least cost as a metric when evaluating utility decisions. Utilities often have more analytical capability than a PUC's staff. That unequal information, coupled with the utility's incentive to overinvest in projects that qualify for the rate of return, place the PUC at a disadvantage. Least cost is a quantitative metric that can ground the PUC's analysis.[70] It may also limit the PUC's discretion, thereby addressing the often-cited concern about agency capture.[71]

Least cost is a blunt tool to accomplish these goals. In addition to the inherent subjectivity in its application, overemphasis on least cost may result in harm to public health and welfare.[72] A rigid focus on near-term costs may also limit

67. *See id.* at 1636–51 (discussing the evolution of public utility law).

68. PUCs generally rely on other agencies to limit other social impacts of the electricity sector, such as establishing air quality limits. *See, e.g.*, Inara Scott, *Teaching an Old Dog New Tricks: Adapting Public Utility Commissions to Meet Twenty-First Century Climate Challenges*, 38 HARV. ENV'T. L. REV. 371, 375 (2014) ("[U]nless legislation specifically requires public utility commissions to consider environmental, technological, or policy matters, they will focus—almost exclusively—on rate impacts to current customers.").

69. *E.g.*, Pacificorp, 227 P.U.R.4th 462 (Or. Pub. Utils. Comm'n Aug. 25, 2003), 2003 WL 22293212, at *1 ("Substantively, the Commission requires that energy utilities: (1) evaluate resources on a consistent and comparable basis; (2) consider uncertainty; (3) make the primary goal of the process a resource plan that is least cost to the utility and its ratepayers and consistent with the public interest; and (4) create a plan that is consistent with the energy policy of the state of Oregon").

70. David B. Spence, *Can Law Manage Competitive Energy Markets?*, 93 CORNELL L. REV. 765, 771 (2008).

71. Nicholas Bagley & Richard L. Revesz, *Centralized Oversight of the Regulatory State*, 106 COLUM. L. REV. 1260, 1284 (2006). For a discussion of agency capture, or regulatory capture, see generally George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3 (1971) (arguing that regulation is often "designed and operated primarily for [the] benefit" of the regulated industries).

72. See the discussion of the Clean Air Act Mercury and Air Toxics Rule, *infra,* Subpart II.C.

consideration of investments that could result in lower costs in the medium or long term.[73]

The least cost mandate is not absolute. PUCs recognize that circumstances may change over time and that higher costs may be justified to ensure reliability or maintain a diverse energy mix.[74] In general, however, PUCs expect a utility to select options that maintain an affordable and reliable system without imposing unnecessary or imprudent costs. State laws may require the least cost approach[75] or PUCs may adopt the approach on their own initiative.[76] Least cost may apply to long-term planning processes,[77] specific power generation investments,[78] or grid operations.[79]

PUCs often cite the least cost principle as if it is an objective standard.[80] It is not. Least cost in the short term—based on existing laws and technologies that are considered cost-effective at the time—may lead to a very different result than that

73. Jonas J. Monast, *Maximizing Utility in Electric Utility Regulation*, 43 FLA. ST. U. L. REV. 135, 152 (2015) ("Ignoring the prospect of higher costs over the lifetime of a facility may subject consumers to higher prices while also robbing them of the benefits of early action.").
74. For examples of different applications of the least cost approach, see *id.* at 156–174.
75. *See, e.g.*, MONT. ADMIN. R. 38.5.2001-.2016 (2015) (defining guidelines for least cost planning for electric utilities).
76. *See, e.g.*, Ky. Power Co., No. 2009–00545 (Ky. Pub. Serv. Comm'n June 28, 2010), 2010 WL 2640998, at *3 ("The Commission has long recognized that 'least cost' is one of the fundamental principles utilized when setting rates that are fair, just, and reasonable.").
77. *See, e.g.*, Pacificorp, 227 P.U.R.4th 462 (Or. Pub. Utils. Comm'n Aug. 25, 2003), WL 2293212, at *1 ("[T]he Commission requires that energy utilities . . . make the primary goal of the [long-term planning] process a resource plan that is least cost to the utility and its ratepayers and consistent with the public interest."); Least Cost Integrated Res. Plan., 98 P.U.R.4th 115 (N.C. Utils. Comm'n Dec. 8, 1988), 1988 WL 391201 ("Each utility shall develop and keep current a least cost integrated resource plan").
78. *See, e.g.*, Utility Scale Request for Offer (RFO), CA. PUB. UTILS. COMM'N, https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/rps/rps-utility-scale-rfo [https://perma.cc/7E9F-JW2E] (instructing investor-owned utilities to use a "least-cost best-fit" evaluation process when selecting offers for compliance with California's renewable portfolio standard); Ky. Power Co., 2010 WL 2640998 (rejecting a proposed power purchase agreement for wind power because the utility did not demonstrate that the contract satisfied the principle of least cost).
79. *See, e.g.*, Am. Lung Ass'n v. EPA, 985 F.3d 914, 937 (D.C. Cir.), *cert. granted sub nom.* N. Am. Coal Corp. v. EPA, 142 S. Ct. 417, 211 L. Ed. 2d 243 (2021), *and cert. granted sub nom.* North Dakota v. EPA, 142 S. Ct. 418, 211 L. Ed. 2d 243 (2021), *and cert. granted in part sub nom.* Westmoreland Mining Holdings LLC v. EPA, 142 S. Ct. 418, 211 L. Ed. 2d 243 (2021), *and cert. granted sub nom.* West Virginia v. EPA, 142 S. Ct. 420, 211 L. Ed. 2d 243 (2021) (discussing "Constrained Least-Cost Dispatch" whereby "generators with the lowest variable costs" will be dispatched "first, as system operational limits allow, until all demand is satisfied.") (internal citations omitted).
80. Ky. Power Co., 2010 WL 2640998.

of a similar inquiry which considers the risk that regulations and technologies may change significantly over the lifetime of a power plant.[81]

C. Economic Regulation and the Energy–Environment Divide

States take different approaches regarding a PUC's authority to consider the environmental and public health impacts of a utility's decision. The Colorado PUC must consider "new clean energy and energy-efficient technologies" when evaluating utility investments and planning, including "the beneficial contributions such technologies make to Colorado's energy security, economic prosperity, insulation from fuel price increases, and environmental protection."[82] Colorado law also allows the PUC to consider "the likelihood of new environmental regulation and the risk of higher future costs associated with the emission of greenhouse gases. . . when it considers utility proposals to acquire resources."[83] North Carolina's PUC must "encourage and promote harmony between public utilities, their users and the environment," among numerous other public policy goals.[84]

Other states require PUCs to include environmental considerations as part of their least cost calculations. Vermont's PUC must account for environmental costs when evaluating a utility's least-cost integrated plan for meeting consumer energy needs.[85] Similarly, Maryland's commission must account for "the economy of the state" as well as "the conservation of natural resources, and the preservation of environmental quality."[86] In contrast, North Dakota prohibits its PUC and its electric utilities from considering "environmental externality values in the planning, selection, or acquisition of electric resources or the setting of rates for providing electric service."[87]

81. *See, e.g.*, Melissa Powers, *The Cost of Coal: Climate Change and the End of Coal as a Source of "Cheap" Electricity*, 12 U. PA. J. BUS. L. 407, 424–26 (2010) (discussing state PUC decisions finding that coal is not least cost); Ky. Utilities Co. v. Pub. Serv. Comm'n, 252 S.W.2d 885, 897 (Ky. 1952) ("The Public Service Commission necessarily must base its decision and actions on the economic conditions existing at the time a case is before it, and it is not in the public interest that a case be prolonged indefinitely by allowing a reconsideration whenever there is a fluctuation in price levels.").
82. COLO. REV. STAT. § 40-2-123(1)(a) (2015).
83. *Id.* § 40-2-123(b)(1).
84. N.C. GEN. STAT. § 62-2(a)(5) (2014).
85. VT. STAT. ANN. tit. 30, § 218c. (2018).
86. MD. CODE ANN., PUB. UTIL. § 2-113 (2016).
87. N.D. Cent. Code § 49-02-23 (2021).

Hope Natural Gas established the end results test before federal and state governments were involved in other public interest pursuits, such as limiting pollution. It is unquestionably in the general public interest to ensure that utilities limit pollution, help mitigate climate change, and do not spark wildfires. The public, therefore, has an interest in the types of resources a utility uses to generate electricity, whether a utility invests in energy saving measures, and whether a utility positions itself to take advantage of new technologies that can reduce costs and environmental impacts. Electricity ratemaking can, and should, reflect these interests.

Even when state statutes require PUCs to consider varying degrees of environmental impacts, however, commissioners often draw distinctions between economic regulation and environmental regulation.[88] Despite the wide-ranging impacts of the ratemaking process, ratemaking today largely focuses on consumer protection for ratepayers, financial health for the utility, and fair compensation for investors. For many PUCs, the relevant risks are those that could undermine the firm's ability to provide the service or could result in unreasonable prices for the firm's customers. The PUC may view environmental concerns as beyond their jurisdiction, outside their areas of expertise, or too subjective to credibly address through ratemaking.[89] As the Massachusetts Department of Public Utilities stated in a proceeding exploring whether to restructure its electricity sector:

> With respect to environmental impacts, economic regulators have first and foremost ensured that electric companies

88. *See, e.g.,* Puget Sound Energy, Inc., No. 4 (Wash. Utils. & Trans. Comm'n Sept. 27, 2011), 2011 WL 4537778, at *3 (noting that "the Commission is principally an economic regulator and that a general rate proceeding such as this is focused specifically on the Company's costs and their recovery in rates" and allowing the Sierra Club to intervene "[t]o the extent [the organization] wishes to present evidence or advocacy on cost and ratemaking issues"); United Illuminating Co., No. 00–04–05 (Conn. Dep't Pub. Util. Control Oct. 31, 2001), 2001 WL 1854023 (denying a petition for reconsideration filed by an environmental justice coalition that challenged approval of a sale of a power plant because "[t]he Department [of Public Utility Control] serves as economic regulators, and as such, the Department's approval was based on the conclusion that the sale was in the interest of [the utility] and its customers and that the sale would have the effect of minimizing ratepayer costs").

89. *See, e.g.*, Least Cost Integrated Res. Plan., 112 P.U.R.4th 303 (N.C. Utils. Comm'n May 17, 1990), 1990 WL 488726 (distinguishing between environmental compliance costs and the "substantial subjective judgment and guesswork" required to "estimate costs associated with 'external' environmental effects"). "The Commission agrees with each stipulation that it is generally not practical to attempt to include cost estimates for 'external' environmental effects over and above those identified by appropriate environmental agencies. The Commission is aware that numerous federal and state governmental agencies are responsible for identifying environmental effects, developing regulations, and ensuring compliance with those regulations." *Id.*

> minimize costs to comply with current environmental regulations and minimize long-term costs to consumers by anticipating the impacts of potential future requirements. Economic regulators have also implemented policies that encourage resource selection decisions that favor less polluting generating resources, all else being equal. The task of economic regulators has not been to determine and hold utilities to environmental standards different from or more stringent than those imposed by environmental regulators.[90]

Courts may also impose a stark line between economic and environmental regulations. For example, in *Grand Council of the Crees v. FERC*, the D.C. Circuit concluded that the Federal Power Act's requirement that wholesale electricity rates are just and reasonable did not allow Federal Energy Regulatory Commission (FERC) to consider environmental harms that may result from a power project.[91] Relying on *Hope Natural Gas*, the court described FERC's role as purely "economic," noting that the U.S. Supreme Court has never suggested that FERC could "encompass considerations of environmental impact" and that the FERC has "affirmatively forsworn environmental considerations."[92]

On the surface, the *Grand Council of the Crees* holding limits FERC's discretion to consider noneconomic considerations. The D.C. Circuit's limited view of FERC's authority does not forbid consideration of environmental impacts, however. At most, it limits FERC's ability to directly govern environmental harms by increasing rates to avoid negative impacts.[93] The decision would not limit FERC's consideration of how environmental harms may translate into economic impacts for the power plant, such as increased regulatory costs that would cause rate increases for customers.[94] Furthermore, while it may be the case that PUCs are not authorized to set emissions limits or base decisions explicitly on

90. Elec. Indus. Restructuring, 163 P.U.R.4th 96 (Mass. Dep't Pub. Utils. Aug. 16, 1995), 1995 WL 542479, at *17.

91. Grand Council of the Crees v. FERC, 198 F.3d 950, 956–57 (D.C. Cir. 2000) (finding that the discretion inherent in "setting 'just and reasonable' rates" does not "encompass considerations of environmental impact").

92. *Id.*

93. *Id.*; *see also* Richard D. Cudahy, *PURPA: The Intersection of Competition and Regulatory Policy*, 16 ENERGY L.J. 419, 435 (1995) ("The FERC . . . does not seem to permit assessing the probabilities of even an impending or foreseeable conversion of social costs to pecuniary costs.").

94. Emily Hammond & David B. Spence, *The Regulatory Contract in the Marketplace*, 69 VAND. L. REV. 141, 157–58 (2016) (noting the how regulators' concerns about social costs of electricity generation "puts pressure on the electricity market structure. . . . [which] raises a number of important questions about the boundaries of regulators' jurisdiction.").

environmental concerns, the public interest role should also allow PUCs to evaluate risks to society, including risks that a course of action could result in more stringent regulations in the future when evaluating investment alternatives.

The same reasoning applies to state PUCs that are not required to consider environmental impacts, as well as PUCs that are prohibited from doing so. As described in Part III, these PUCs can use a risk-based approach to achieve some of the same goals as explicit environmental policy. Avoiding options that contribute to public health harms is not synonymous with the environmental regulator's role of directly governing pollution. For example, investments in demand response, energy efficiency, or renewable energy may result in cost savings for ratepayers in addition to the environmental and social benefits of avoiding new infrastructure.[95] Investing in cleaner energy technologies improves public health and also reduces long-term costs depending on how technologies and fuel prices change. These examples involve the PUC considering investment pathways that hedge risk to the utility and ratepayers by reducing negative impacts on society, not directly regulating a pollutant. Ratemaking will determine whether the costs of pollution and the benefits of clean energy are considered at the outset, or whether the costs are borne in the future as society deals with the negative impacts of dirtier generation options.

Ratemaking could allow commissions to evaluate risks that may affect short-term and long-term costs or reliability—concerns that are unquestionably within the PUC's mandate. If the analysis suggests a greater likelihood of increased regulatory costs over the operating life of a power plant, for example, the PUC's existing legal authority should allow the commission to approve utility investments that avoid the risk.

D. A Sector in Transition

Applying the least cost standard to today's transitioning electricity sector is particularly challenging because commissions must determine which potential futures to compare. The least cost standard may aid in decisionmaking when there

95. *See generally* Shelley Welton, *Non-Transmission Alternatives*, 39 HARV. ENV'T. L. REV. 457, 464–70 (2015) (examining barriers to energy efficiency, demand response, and other alternatives to electricity transmission); *see, e.g.*, Larry Pearl, *Xcel Assesses Non-Wires Alternatives to Distribution Upgrade as It Enters New Proceedings in Colorado, Minnesota*, UTIL. DIVE (Jan. 30, 2020), https://www.utilitydive.com/news/xcel-assesses-non-wires-alternatives-to-distribution-upgrade-as-it-enters-n/571290/ [https://perma.cc/9Q6Z-DP86] (reporting on a utility's analysis of "non-wires" options such as demand response, energy efficiency, and energy storage).

is an immediate system need and a discrete set of options, but it is far less instructive when planning for future investments and considering the impact of individual decisions on the trajectory of the sector as a whole.

The traditional utility business model developed based on predictable investments in large-scale, centralized generation to meet society's growing energy needs. Utilities had a narrow set of choices for generating electricity, primarily coal and nuclear power for power plants expected to operate consistently and natural gas or petroleum to provide additional power during periods of high demand.[96] Customers had few options for controlling their energy use and on-site electricity generation was often impractical.

This is no longer the case. Utilities are retiring coal-fired power plants due primarily to low natural gas prices resulting from the hydraulic fracturing boom.[97] Nuclear power plants are aging and many of those operating in competitive markets now depend on state policies to help cover their operating expenses.[98] Solar and wind generation are increasingly competitive.[99] The cost of energy storage is also falling quickly and utilities are investing in "solar plus storage" facilities.[100] New smart home technologies allow consumers to reduce their electricity use.[101] Residential and commercial solar generation continues to

96. Michael Mobilia & Owen Comstock, *Petroleum, Natural Gas, and Coal Continue to Dominate U.S. Energy Consumption*, U.S. ENERGY INFO. ADMIN.: TODAY IN ENERGY (July 1, 2019), https://www.eia.gov/todayinenergy/detail.php?id=40013 [https://perma.cc/6JHA-K6YL]; *U.S. Energy Facts Explained*, U.S. ENERGY INFO. ADMIN. (June 10, 2022), https://www.eia.gov/energyexplained/us-energy-facts [https://perma.cc/9VR2-EK9N].

97. Slade Johnson & Kien Chau, *More U.S. Coal-Fired Power Plants Are Decommissioning as Retirements Continue*, U.S. ENERGY INFO. ADMIN. (July 26, 2019), https://www.eia.gov/todayinenergy/detail.php?id=40212 [https://perma.cc/5QQW-F942].

98. Monast, *supra* note 11, at 688–90.

99. *See* Suparna Ray, *New Electric Generating Capacity in 2020 Will Come Primarily From Wind and Solar*, U.S. ENERGY INFO. ADMIN. (Jan. 14, 2020), https://www.eia.gov/todayinenergy/detail.php?id=42495 [https://perma.cc/Z6LT-CC6F].

100. *See, e.g.*, Jules Scully, *NV Energy Files Plans for Three Solar-Plus-Storage Projects in Nevada*, PV TECH (July 21, 2020), https://www.pv-tech.org/news/nv-energy-files-plans-for-three-solar-plus-storage-projects-in-nevada [https://perma.cc/BA9P-5M3T]; Julian Spector, *Enel Reveals Plan to Add 1GW of Batteries to US Renewables Fleet by 2022*, GREENTECH MEDIA (July 21, 2020), https://www.greentechmedia.com/articles/read/enel-to-build-1gw-of-us-energy-storage-by-2022 [https://perma.cc/Y9E8-UKFG].

101. *See* NEST LABS, ENERGY SAVINGS FROM THE NEST LEARNING THERMOSTAT: ENERGY BILL ANALYSIS RESULTS 2 (2015), https://storage.googleapis.com/nest-public-downloads/press/documents/energy-savings-white-paper.pdf [https://perma.cc/5D9R-FL87].

expand.[102] Greater adoption of electric vehicles could change electricity demand.[103]

These changes impact the nation's energy mix as well as the institutions that oversee public utilities. Public and private governance are increasingly affecting utility planning. Federal environmental law is in flux, complicating planning for long-term investments. The Trump administration reversed many of the Obama-era rules and the Biden administration will seek to restore many of those rules and implement additional policies to reduce greenhouse gas emissions.[104] A growing number of companies have internal clean energy goals and are pressuring utilities to provide electricity that supports their commitments. States are calling for a transition to 100 percent clean energy by the middle of the century[105] and some utilities are announcing their own clean energy commitments.[106] Thus, it is critical to ensure that ratemaking responds to these changes by ensuring affordable and reliable electricity without hindering a rapid move to clean energy.

In addition, electric utilities must address legacy impacts of past investment decisions such as coal ash pollution, as well as increasing numbers of droughts, catastrophic fires, and storms caused by a changing climate. For example, a recent Moody's report notes that:

> Shifting temperatures and humidity levels associated with climate change can increase financial risk for utilities by contributing to sharp increases or declines in energy demand.
>
> Higher temperatures also pose risk for utilities, as heat stress can impede thermoelectric power generation by reducing a

102. *See, e.g.,* Sara Hoff & Anodyne Lindstrom, *Texas and Florida Had Large Small-Scale Solar Capacity Increases in 2020*, U.S. ENERGY INFO. ADMIN. (Mar. 4, 2021), https://www.eia.gov/todayinenergy/detail.php?id=46996 [https://perma.cc/4D5G-VN3J] (reporting data on small-scale solar energy capacity growth).

103. *Global EV Outlook 2020*, INT'L ENERGY AGENCY (June 2020), https://www.iea.org/reports/global-ev-outlook-2020 [https://perma.cc/7Q82-7WQW].

104. *Tracking Deregulation in the Trump Era*, BROOKINGS (Feb. 1, 2020), https://www.brookings.edu/interactives/tracking-deregulation-in-the-trump-era [https://perma.cc/JA8T-QK3Q].

105. *See, e.g.,* CAL. PUB. UTIL. CODE § 454.53(a) (West 2020); HAW. REV. STAT. ANN. § 269-92(a)(6) (West 2019); ME. STAT. tit. 35-A, § 3210 (1-A) (2020).

106. *See* ARIZ. PUB. SERV. CO., WE'RE ALL IN FOR ARIZONA: OUR CLEAN ENERGY COMMITMENT 4 (2020), https://www.aps.com/-/media/APS/APSCOM-PDFs/About/Our-Company/Energy-Resources/CleanEnergyReport.ashx?la=en&hash=892A9322B8DDDD3A7D0EDE129FF15197 [https://perma.cc/SM2W-2H4S]; DUKE ENERGY, *ACHIEVING A NET ZERO CARBON FUTURE: DUKE ENERGY 2020 CLIMATE REPORT* 1 (2021), https://www.duke-energy.com/_/media/pdfs/our-company/climate-report-2020.pdf?la=en [https://perma.cc/TU4Q-NVK6].

> power plant's cooling capacity. Heavy demand for cooling devices such as air conditioners places stress on the grid and may even result in power curtailments, rolling brownouts or blackouts.[107]

Responses by the public and private sectors will have far-reaching impacts on climate change, public health, environmental protection, and energy costs for decades to come.

The changes in technology, economics, regulation, and corporate governance are challenging long-standing principles in energy law. Conflicts between federal and state regulators regarding jurisdictional boundaries are ongoing, particularly in competitive wholesale electricity markets.[108] In addition, the expanding number of state policies to mitigate climate change and other environmental impacts of energy production are once again calling into question the division between energy and environmental policymaking. It has always been the case that federal and state ratemaking decisions affect the environment, and environmental policies affect the price of electricity. Now there are efforts to incorporate a carbon price into wholesale electricity markets; there are two state-based carbon markets in the United States and multiple states are updating clean energy and renewable energy policies.[109]

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107. *Research Announcement: Moody's US Regulated Electric Utilities Face Varied Exposure to Climate Hazards,* MOODY'S INVS. SERV. (Jan. 16, 2020), https://www.moodys.com/research/Moodys-US-regulated-electric-utilities-face-varied-exposure-to-climate—PBC_1210434 [https://perma.cc/JL4E-RY6Q].

108. *See generally* Ari Peskoe, *Easing Jurisdictional Tensions by Integrating Public Policy in Wholesale Electricity Markets*, 38 ENERGY L.J. 1 (2017); Jim Rossi, *The Brave New Path of Energy Federalism*, 95 TEX. L. REV. 399 (2016).

109. *FERC Proposes Policy Statement on State-Determined Carbon Pricing in Wholesale Markets*, FERC (Oct. 15, 2020), https://www.ferc.gov/news-events/news/ferc-proposes-policy-statement-state-determined-carbon-pricing-wholesale-markets [https://perma.cc/KFA2-XHAN] (summarizing a proposed FERC policy statement that "seeks to encourage regional electric market operators to explore and consider the benefits" of incorporating carbon prices into wholesale electricity markets); Matt Butner, Bethany Davis Noll, Justin Gundlach, Burcin Unel & Ari Zevin, INST. FOR POL'Y INTEGRITY, CARBON PRICING IN WHOLESALE ELECTRICITY MARKETS: AN ECONOMIC AND LEGAL GUIDE, 1 (2020), https://policyintegrity.org/files/publications/Carbon_Pricing_in_Wholesale_Electricity_Markets_Report.pdf [https://perma.cc/2QZT-GXQ9] (providing an overview of carbon pricing in wholesale electricity markets and identifying economic and legal criteria for designing carbon-pricing rules); DUKE NICHOLAS INST., CARBON PRICING IN WHOLESALE ENERGY MARKETS: CONFERENCE BRIEF 1-2 (2020), https://nicholasinstitute.duke.edu/sites/default/files/publications/Carbon_Pricing_in_Wholesale_Energy_Markets_Conference_Brief.pdf [https://perma.cc/YWC4-4G96] (summarizing an academic conference exploring carbon pricing in wholesale electricity markets); Jonas Monast, *From Top-Down to Bottom-Up Climate Policy: New Challenges in Carbon Market Design*, 8 SAN

Together, these changing circumstances are creating significant uncertainty for electric utilities at a time when the sector requires hundreds of billions of dollars in investments to update the grid and replace the retiring generation of infrastructure. It is critical, therefore, that policymakers and legal scholars reconsider the role of the PUC. The PUC's historically narrow focus on the economics of operating the electricity grid will not, by itself, produce an affordable, reliable, and clean future for the electricity sector. Furthermore, with new technologies and shifting energy economics, many of the harms once accepted in exchange for affordable and reliable electricity are no longer necessary. Realizing the benefits requires changing the incentives for rate-regulated electric monopolies.

II. RATEMAKING AS RISK GOVERNANCE

The narrow focus on cost masks the risk governance role of the PUC. As Justices Jackson and Frankfurter argue in their respective *Hope Natural Gas* dissents, the ratemaking process includes non-economic considerations.[110] The scope is often limited to factors with direct financial impacts on ratepayers, the utility, or investors, but state laws generally allow PUCs to consider public benefits beyond cost minimization and shareholder returns.[111]

Risk governance is an alternate legal foundation for interpreting the bedrock principles of ratemaking. The economic regulator evaluates prudency, reasonableness, least cost, and the public interest in financial terms. Rather than directly address the broader impacts of utility decisions, PUCs generally look to other agencies to address risks external to the utility's direct operations. Meanwhile, they make decisions that increase risks to ratepayers and the public, and potentially to the utility itself.

The risk regulator may expand the focus. Until recently, many PUCs viewed coal-fired power plants as the prudent option for utilities to provide affordable and reliable electricity. The choice to rely on coal as the dominant fuel source helped keep electricity rates low, but also created immediate health impacts as well as health and environmental risks that future ratepayers, executives, and

DIEGO J. CLIMATE & ENERGY L. 175, 188 (2017) (discussing the California Cap-and-Trade Program and the Regional Greenhouse Gas Initiative).

110. Fed. Power Comm'n v. Hope Nat. Gas, 320 U.S. 591, 627 (1944) (Frankfurter, J., dissenting); *id.* at 646 (Jackson, J., dissenting).

111. *See, e.g.*, *PSC Approves Hike, Orders Cost Study*, 3870 PUR UTIL. REGUL. NEWS 1 (2008) (summarizing a Montana Public Service Commission decision that concluded "the cost of externalities can be incorporated into costbased pricing").

communities must manage.[112] Past investments also affect the cost to reduce these risks in the future, thus influencing which choices a PUC may consider to be in the public interest.

As noted above, environmental protection affects energy prices. A PUC may not view mitigating climate change as falling within its jurisdiction, but it is responsible for considering threats to utility functions such as storm risk or wildfires.[113] Even when the risk falls outside the traditional scope of the PUC, there is a direct link between the choice to invest in a less expensive but higher polluting power plant and the future costs and impacts of climate change. Electric utilities are responsible for approximately one-third of the United States' carbon dioxide emissions.[114] Climate change is also a risk multiplier for utilities and society, posing a direct threat to utility infrastructure and increasing threats to the general public.[115] Mitigating greenhouse gas emissions can mitigate risk to the utility as well as the public.

By focusing on risk avoidance and mitigation in order to maintain affordability and reliability, PUCs can bring these broader societal impacts within their jurisdiction. This is a more effective approach to evaluating utility investments than cost alone. Conversely, the failure to consider risk may lead to higher regulatory costs, stranded assets, and litigation costs in the future.

PUC decisionmaking often distinguishes between three categories of risk. The first category involves risk to the utility's ability to provide safe, reliable service, including its ability to attract investors, manage debt, operate its system, and

112. Until recently, the electric power sector was responsible for 50 percent of the nation's mercury emissions, 60 percent of sulfur dioxide emissions, and more than 75 percent of acid gases. *Mercury and Air Toxics Standards: Cleaner Power Plants*, U.S. EPA, https://www.epa.gov/mats/cleaner-power-plants [https://perma.cc/XSD8-2QHQ]. These pollutants cause cancer, contribute to respiratory problems, and can cause ecological harms such as acid rain. *Clean Air Markets: Power Plants and Neighboring Communities*, U.S. EPA, https://www.epa.gov/airmarkets/power-plants-and-neighboring-communities [https://perma.cc/VE54-P5VY].

113. For example, in 2019 the Florida PUC adopted an order "requir[ing] utilities to create ten-year storm protection plans to reduce restoration costs and outage times associated with extreme weather events," thus allowing utilities to recover costs of burying powerlines to mitigate the impact of hurricanes. *PSC Moves Forward With Storm Protection Rules*, FLA. PUB. SERV. COMM'N, (Nov. 5, 2019), https://www.floridapsc.com/Home/NewsLink?id=11797 [https://perma.cc/3E7G-3QAM].

114. *Frequently Asked Questions: How Much of U.S. Carbon Dioxide Emissions Are Associated With Electricity Generation?*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/tools/faqs/faq.php?id=77&t=11 [https://perma.cc/K4UU-WFND].

115. *See, e.g.*, WILDFIRES AND CLIMATE CHANGE: CALIFORNIA'S ENERGY FUTURE, at 1 (Apr. 12, 2019), https://www.gov.ca.gov/wp-content/uploads/2019/04/Wildfires-and-Climate-Change-California%E2%80%99s-Energy-Future.pdf [https://perma.cc/C787-D9BV] (discussing the threat of utility insolvency due to wildfires).

prepare for future needs. The second category involves financial risks to the ratepayer, including the risk that the utility will use its market power to charge unreasonably high rates, overinvest in infrastructure, or charge the customer for investments that do not deliver benefits. These first two categories indisputably fall within the authority of the PUC.

The third category involves risks created by the utility, in whole or in part, but not directly related to rates or finances. PUCs often view these risks, which include public health and environmental impacts, as beyond their jurisdiction. Rates must allow utilities to comply with regulatory requirements and court decisions, but PUCs do not unilaterally set emission limits or enforce environmental regulations.

Ignoring broad categories of risk rejects a common sense understanding of the public's interest in the evolution of the electricity sector. It also threatens to increase utility and ratepayer costs over time. This Part identifies how ratemaking mitigates certain risks for ratepayers, utilities, and investors/lenders. It then explains how ratemaking allocates risks among different stakeholders and creates additional risks for the utility, ratepayers, and society.

A. Ratemaking as Risk Mitigation

The cost of service model aims to mitigate many financial and reliability risks for ratepayers and utilities. The just and reasonable mandate is based on the principle that customers should only pay for services for which they receive value. Utility law also aims to prevent utilities from abusing their market power to charge unreasonably high rates, discriminate against certain customers, or overinvest to justify higher returns for investors.[116] Ratemaking principles also aim to protect customers from financial responsibility for utility assets that never go into service, although the allocation of costs for a canceled project is dependent upon the circumstances.[117]

Ratemaking, including the rate of return, mitigates risks for utilities by providing financial certainty. This, in turn, helps the utility attract investors and reduces the cost of capital through lower interest rates.[118] The prohibition on

116. Richard J. Pierce Jr., *A Proposal to Deregulate the Market for Bulk Power*, 72 VA. L. REV. 1183, 1192 (1986).

117. *See, e.g.*, Duquesne Light Co. v. Barasch, 488 U.S. 299, 312 (1989) (allocating costs of an unfinished nuclear power plant between ratepayers and the electric utility).

118. Jersey Cent. Power & Light Co. v. FERC, 810 F.2d 1168, 1178 (D.C. Cir. 1987); Boyd, *supra* note 13, at 1643–44.

confiscatory rates mitigates political pressure to keep rates low.[119] The exclusive service territory removes the risk that customers may choose a competitor, thus leaving the utility and its remaining customers on the hook for a system designed to provide power to everyone within the utility's territory.[120] The prohibition on retroactive ratemaking benefits investors by limiting the risk that changing circumstances could undermine reasonably anticipated returns.[121]

The cost of service model also mitigates threats to system reliability. If utilities determine that additional investments are necessary to maintain reliability, and if the PUC accepts the utility's analysis, ratemaking facilitates the necessary investments. Recent catastrophic fires in the American West and storms in the South and East highlight new risk mitigation challenges for PUCs and the utilities they oversee. Other climate-related impacts, such as water stress and heat waves, also impact utility systems.[122] These events have direct impacts on system costs, system reliability, and utility returns. Mitigating these risks is increasingly becoming a part of the PUC process, whether or not a commissioner accepts the argument that she should incorporate social and environmental risks into the ratemaking process.

B. Ratemaking as Risk Allocation

A long-standing critique of the public utility model is that ratemaking insulates investors from the financial risks that could instill caution and responsible decisionmaking.[123] As noted in the preceding Subpart, PUCs must set utility rates at a level that allows the firm to attract private capital.[124] Under normal circumstances, once a PUC determines that an investment is prudent and thus

119. *See* John N. Drobak, *From Turnpike to Nuclear Power: The Constitutional Limits on Utility Rate Regulation*, 65 B.U. L. REV. 65, 106–07 (1985).
120. *See* SZ Enters., LLC v. Iowa Utils. Bd., 850 N.W.2d 441, 445 (Iowa 2014).
121. Stefan H. Krieger, *The Ghost of Regulation Past: Current Applications of the Rule Against Retroactive Ratemaking in Public Utility Proceedings*, 1991 U. ILL. L. REV. 983, 997–98.
122. Andre Bertolotti & Yuxi Suo, *Troubled Waters,* BLACKROCK INV. INST., (Dec. 2021), https://www.blackrock.com/corporate/insights/blackrock-investment-institute/publications/troubled-waters# [https://perma.cc/FBA7-RDH5] (assessing water-related stresses for different economic sectors, including electric power); Nicholas K. Geranios & Andrew Selsky, *Blackouts in US Northwest Due to Heat Wave, Deaths Reported*, AP NEWS (June 29, 2021), https://apnews.com/article/climate-change-government-and-politics-business-environment-and-nature-6a66be20ed86ad18ed131156c9f7a517 [https://perma.cc/P6W3-4Q7D].
123. David B. Spence, *Can Law Manage Competitive Energy Markets?*, 93 CORNELL L. REV. 765, 771–72 (2008).
124. *See supra* Subpart I.A.

incorporates it into the utility's rate base, ratepayers compensate the utility even if circumstances change.[125] PUCs may reduce the authorized rate of return on the rate base or decline a utility's request to raise rates, but they may not second-guess a previous decision to include a utility's expenditure in the rate base.[126] This provides a high degree of certainty to the utility and its investors once the PUC incorporates a capital expenditure in the utility's rate base.

Although ratemaking reduces the financial risk to the utility, it does not eliminate the risk itself. Instead, ratemaking shifts much of the financial risk from the utility's shareholders to the utility's ratepayers. Greater certainty for investors means the utility has a lower cost of capital, which in turn can help keep costs down for ratepayers.[127] Insulating utilities from financial impacts if circumstances change, however, may also cause executives to be less risk averse when evaluating investment options.[128]

The utility's ability to pass higher fuel costs on to customers rather than absorb them through fuel costs is another instance of allocating financial risk to ratepayers.[129] Rate-regulated monopolies are not at risk of losing market share to competitors with lower operating costs, unlike power plant owners in restructured electricity markets where independent companies compete to sell power to a grid operator.[130] A utility may shift generation from one power plant to another within their system if it would lead to greater profitability, but it is not directly vulnerable to lower operating costs elsewhere in the electricity grid.[131]

125. Guy Burdick, *Retroactive Rates Unconstitutional, APS Says to Questions of Overearning*, UTIL. DIVE (June 22, 2020), https://www.utilitydive.com/news/retroactive-rates-unconstitutional-aps-says-to-questions-of-overearning/580202 [https://perma.cc/T7SG-VW8Z]. *See* Krieger, *supra* note 121, at 997.

126. *See, e.g.*, La. Power & Light Co. v. La. Pub. Serv. Comm'n, 523 So. 2d 850, 857 (La. 1988) ("Pervading the utility ratemaking process is the fundamental rule that rates are exclusively prospective in application and that future rates may not be designed to recoup past losses.").

127. Drobak, *supra* note 119 ("[M]any, perhaps most, owners of utility common stock are unsophisticated investors who. . . . forego greater returns in the belief that their stock represents a relatively small risk investment.").

128. *See, e.g.*, Jersey Cent. Power & Light Co. v. FERC, 810 F.2d 1168, 1190 (D.C. Cir. 1987) (Starr, J., concurring).

129. The general PUC ratemaking formula allows utilities to earn returns on capital investments but not variable operating expenses. *See* Lazar, *supra* note 46, at 49, fig.8-1.

130. With the possible exception of high energy prices incentivizing residential and commercial customers to install rooftop solar.

131. For example, Southeastern monopoly utilities responding to low natural gas prices by dispatching gas plants before coal plants for the first time in 2012. *Cheaper Natural Gas Alters Generation Dispatch in Southeast*, U.S. ENERGY INFO. ADMIN. (Dec. 6, 2012), https://www.eia.gov/todayinenergy/detail.php?id=9090 [https://perma.cc/AJ2M-SWJR].

Some states authorize further reallocation of financial risks by allowing utilities to recover costs during the construction phase for high-cost, high-risk projects such as nuclear power plants.[132] Without cost recovery during the construction phase, utilities may not have sufficient capital to complete the project and the finance costs may be prohibitively high for projects with long construction timelines.[133] The policy can facilitate the construction of some projects, such as nuclear power plants, that otherwise would not be financially viable. It can also allow utilities to be less risk averse, removing some incentives for proper management and oversight.[134]

Each capital investment in a power plant makes it more likely the PUC will approve rate recovery for future investments necessary to keep the plant operational until the costs are fully depreciated. PUCs may also approve cost recovery for uneconomic power plants if commissioners determine that doing so is necessary for grid reliability or is otherwise in the best interest of ratepayers.[135] Utilities, therefore, generally avoid stranded asset risks, leaving ratepayers again bearing the financial burden.[136] Utilities may also avoid stranded asset risk by seeking compensation for undepreciated assets prior to early retirement. This may take the form of early depreciation, whereby rates

132. *See, e.g.*, Base Load Review Act, S.C. CODE ANN. § 58-33-210 (2014); MISS. CODE ANN. § 77-3-101 (West 2013); Georgia Nuclear Energy Financing Act, GA. CODE ANN. § 46-2-25 (West 2010).

133. *See* William Boyd & Ann E. Carlson, *Accidents of Federalism: Ratemaking and Policy Innovation in Public Utility Law*, 63 UCLA L. REV. 810, 848 (2016).

134. Emily Hammond & Jim Rossi, *Stranded Costs and Grid Decarbonization*, 82 BROOK. L. REV. 645, 652–55 (2017); Boyd & Carlson, *supra* note 133, at 849.

135. ERIC GIMON, MIKE O'BOYLE, CHRISTOPHER T.M. CLARK & SARAH MCKEE, THE COAL COST CROSSOVER: ECONOMIC VIABILITY OF EXISTING COAL COMPARED TO NEW LOCAL WIND AND SOLAR RESOURCES 11 (2019), https://energyinnovation.org/wp-content/uploads/2019/04/Coal-Cost-Crossover_Energy-Innovation_VCE_FINAL2.pdf [https://perma.cc/5LYN-GE5Q].

136. Stranded assets are "the net book value of a utility's . . . assets not yet recovered through depreciation that has become unrecoverable." Roger A. Greenbaum, Annotation, *Special Commentary: Recovery of "Stranded Costs" by Utilities*, 80 A.L.R. 6th 1, § 7 (Originally published in 2012). There is no consensus that stranded assets are a major concern for the electric power sector. *Compare* CHARLES TEPLIN, MARK DYSON, ALEX ENGEL & GRANT GLAZER, ROCKY MOUNTAIN INST., THE GROWING MARKET FOR CLEAN ENERGY PORTFOLIOS 9 (2019), https://rmi.org/insight/clean-energy-portfolios-pipelines-and-plants [https://perma.cc/KZ7P-R3X6] (finding that "nearly all [proposed] combined cycle [natural gas-fired power plants] will be economically precarious well before they are fully paid for"), *with* Catherine Morehouse, *Utilities Don't See Stranded Assets as a Top Risk. Should They?*, UTIL. DIVE (Feb. 14, 2020), https://www.utilitydive.com/news/utilities-dont-see-stranded-assets-as-a-top-risk-should-they/572246 [https://perma.cc/DQX8-A2Q3].

increase to compensate the utility for any remaining depreciation costs for an asset that is at risk of early retirement, or securitization, which allows utilities to recover costs by issuing bonds.[137]

Ratepayers may face increased rates to compensate utilities for past investments, including power plants that are never completed.[138] Investments with high capital costs and depreciation timelines of two decades or more, such as the canceled Atlantic Coast Pipeline in Virginia and North Carolina, may raise more risk than less expensive projects or projects with faster construction schedules.[139]

Financial risk allocation is particularly complex if construction begins on a power plant, but the utility cancels the project before completion.[140] Once a utility begins new construction, the choice to incur the cost is irreversible.[141] It cannot dismantle a power plant and return the parts to the vendors. Rate regulators—and potentially lawmakers—must then determine how to allocate costs between ratepayers and shareholders.[142]

It is too early to gauge the stranded-asset risk associated with new natural gas infrastructure, but it is certain that there is some degree of risk for the utility and public health, financial, and environmental risks for society.[143] In many

137. *See* KATE KONSCHNIK, MARTIN ROSS, JONAS MONAST, JENNIFER WEISS & GENNELLE WILSON, DUKE UNIV. NICHOLAS INST. FOR ENV'T POL'Y SOLS. & THE CTR. FOR CLIMATE, ENERGY, ENV'T, & ECON. AT UNC SCH. OF L., POWER SECTOR CARBON REDUCTION: AN EVALUATION OF POLICIES FOR NORTH CAROLINA 44–45 (2021) (describing early depreciation and securitization); WEILI CHEN, CRISTAL E. JONES, CARMI MARGALIT & RICHARD W. CORTRIGHT, JR., STANDARD & POOR'S, THE RECESSION HASN'T BEEN HARD ON "RATEPAYER OBLIGATION CHARGE" BONDS 2 (2009) (discussing the impact of the 2008–2009 recession on utility's securitized bonds).

138. *See, e.g.*, Richard J. Pierce, Jr., *The Regulatory Treatment of Mistakes in Retrospect: Canceled Plants and Excess Capacity*, 132 U. PA. L. REV. 497, 505 (1984) (discussing rate increases from canceled nuclear power plants).

139. For background on the cancellation of the Atlantic Coast Pipeline, see Erin Cox & Gregory S. Schneider, *Energy Companies Abandon Long-Delayed Atlantic Coast Pipeline*, WASH. POST (July 5, 2020), https://www.washingtonpost.com/local/virginia-politics/atlantic-coast-pipeline-canceled/2020/07/05/da1c0f40-bef5-11ea-b178-bb7b05b94af1_story.html [https://perma.cc/V2QG-TFXX].

140. *See* James J. Hoecker, *"Used and Useful": Autopsy of a Ratemaking Policy*, 8 ENERGY L.J. 303, 311 (1987) (discussing the challenges with allocating costs for a canceled nuclear plant).

141. Hammond & Rossi, *supra* note 134, at 649.

142. Avery G. Wilks & Andrew Brown, *3 Years Later: How the Fallout From SC's $9 Billion Nuclear Fiasco Continues*, POST & COURIER (Aug. 18, 2021), https://www.postandcourier.com/business/3-years-later-how-the-fallout-from-scs-9-billion-nuclear-fiasco-continues/article_5d2a2684-d264–11ea-946f-935bbd3ffa98.html [https://perma.cc/7A53-VTQ6].

143. *See* MARK DYSON, GRANT GLAZER & CHARLES TEPLIN, ROCKY MOUNTAIN INST., PROSPECTS FOR GAS PIPELINES IN THE ERA OF CLEAN ENERGY 9 (2019), https://rmi.org/insight/prospects-for-gas-pipelines-in-the-era-of-clean-energy/

circumstances, natural gas is currently the most economic choice for providing dispatchable electricity.[144] However, battery storage costs are falling and the market for demand response is expanding.[145] Cleaner, more cost-effective options will likely be available before utilities recoup their full investments in the new natural gas infrastructure.[146] If so, PUCs will have to determine whether to allow utilities to retire the gas infrastructure early to gain the benefits of these new options and, if so, how to allocate the costs of doing so.

Insurance or tort liability may address the financial liability ex-post, but ex-post financial compensation does not prevent loss of life or property. Furthermore, ratemaking distorts other market signals that could affect utility decisionmaking. Like fuel costs, utilities can also pass reasonable insurance costs through to consumers.[147] Thus, a higher risk to the electricity grid may not translate to higher risk for the utility and its investors. The filed rate doctrine—"a judicially created doctrine that prevents courts from adjudicating private claims that would effectively vary or enlarge rates charged under a published tariff"—also limits incentives to reduce liability.[148] It protects ratepayers from unanticipated rate hikes, but it may also shield the utility from liability claims.[149]

[https://perma.cc/SPA7-KT6X] ("If proposed gas plants are built, the falling costs of clean energy will likely render over 70 percent of planned capacity uneconomic by 2035.").

144. U.S. ENERGY INFO. ADMIN., LEVELIZED COST AND LEVELIZED AVOIDED COST OF NEW GENERATION RESOURCES IN THE ANNUAL ENERGY OUTLOOK 2019 7, tbl.1A (2019), https://www.eia.gov/outlooks/archive/aeo19/pdf/electricity_generation.pdf [https://perma.cc/WTJ6-HDWK].

145. Logan Goldie-Scot, *A Behind the Scenes Take on Lithium-ion Battery Prices*, BLOOMBERGNEF (Mar. 5, 2019), https://about.bnef.com/blog/behind-scenes-take-lithium-ion-battery-prices [https://perma.cc/XSG8-ANZZ]; ELAINE HALE, LORI BIRD, RAJARAMAN PADMANABHAN & CHRISTINA VOLPI, NAT'L RENEWABLE ENERGY LAB'Y, POTENTIAL ROLES FOR DEMAND RESPONSE IN HIGH-GROWTH ELECTRIC SYSTEMS WITH INCREASING SHARES OF RENEWABLE GENERATION 2 (2018).

146. *See* Robert Walton, *2019 Demand Response Outlook: The Rise of Distributed Resources*, UTIL. DIVE (Jan. 9, 2019), https://www.utilitydive.com/news/2019-demand-response-outlook-the-rise-of-distributed-resources/545397 [https://perma.cc/NQD5-JLBP] (describing one technology—demand response—that could impact the economic outlook for natural gas infrastructure).

147. This is not an absolute.

148. *Minnesota Supreme Court Allows Damage Claims*, 4009 PUR Util. Reg. News 3 (Feb. 25, 2011). "The filed rate doctrine serves to provide predictability and certainty to enable the utility's customers to make decisions according to the rates as approved and the cost of what they are receiving." 64 AM. JUR. 2D PUB. UTIL. § 62 (2021).

149. The filed rate doctrine is not an absolute bar on liability claims. *Pac. Lightnet, Inc. v. Time Warner Telecom, Inc.*, 318 P.3d 97, 110 (Haw. 2013) ("The filed-rate or filed-tariff doctrine does preclude certain types of claims."); *see also Minnesota Supreme Court Allows Damage Claims*, *supra* note 148.

Because ratemaking does not aim to reduce or avoid pollution, the process allocates responsibility for public health and environmental impacts to other agencies and the communities impacted by the utility's operations. Higher-polluting electric power plants are more likely to be located near lower-income communities and communities of color.[150] The unequal distribution of energy impacts also arises in decisions about which communities continue to bear the impacts at a time when utilities are retiring many coal-fired power plants.[151]

Ratemaking takes a different approach to reliability, allocating risks to both the utility and ratepayers, as both may suffer in the event of prolonged outages. The utility may face lost revenue as well as fines and other liability for failure to maintain the grid. Ratepayers may suffer health impacts ranging from the loss of oxygen tanks, to harms from excessive heat or cold, to spoiled foods. There may also be economic impacts for companies forced to shut down during power outages and for their employees.

Utilities mitigate some reliability risk with excess capacity, but this may increase financial risk for the ratepayers bearing the cost of maintaining power plants that are rarely used to generate power.[152] Overinvestment may occur because the forecasts were wrong or because cost of service ratemaking incentivizes utilities to overinvestment in order to maximize profits.

Some states rely on regional wholesale markets to reallocate financial and reliability risks. Electricity sector competition can shift investment risks back to firms operating the power plants, and, depending on the market design, the PUC may no longer ensure that those operators can attract private capital. Reliance on competitive wholesale electricity markets shifts some of the ratemaking function from state PUCs to the FERC. The challenges of risk allocation remain, however. Market operators design the rules that guide market operation, with oversight by FERC.[153] For example, a recent order by FERC benefits older coal-fired power

150. Alice Kaswan, *Environmental Justice and Domestic Climate Change Policy*, 38 ENV'T L. REP. NEWS & ANALYSIS 10287, 10299 (2008).

151. *See, e.g.*, Jeff Brooks-Gillies, *Indiana NAACP Leaders Say Coal Plant Timeline Is Unacceptable for Residents*, ENERGY NEWS NETWORK (Feb. 7, 2019), https://energynews.us/2019/02/07/midwest/indiana-naacp-leaders-say-coal-plant-timeline-unacceptable-for-residents [https://perma.cc/6GXK-ZJQP].

152. U.S. GOV'T ACCOUNTABILITY OFF., GAO-18-131, ELECTRICITY MARKETS: FOUR REGIONS USE CAPACITY MARKETS TO HELP ENSURE ADEQUATE RESOURCES, BUT FERC HAS NOT FULLY ASSESSED THEIR PERFORMANCE (2017), https://www.gao.gov/products/gao-18-131 [https://perma.cc/9PRZ-9LVM].

153. Michael H. Dworkin & Rachel Aslin Goldwasser, *Ensuring Consideration of the Public Interest in the Governance and Accountability of Regional Transmission Organizations*, 28 ENERGY L.J. 543, 558 (2007).

plants that are otherwise uneconomic in the wholesale market that covers many eastern states and parts of the Midwest. The move will cost ratepayers billions of dollars a year and will undermine renewable energy generation in that market, thereby foregoing environmental and economic benefits.[154]

C. Ratemaking as Risk Creation

In addition to allocating many of the known risks to ratepayers or the public, the least cost framework can also create new risks. PUCs traditionally base decisions on laws and other circumstances in existence at the time of the decision due to the challenges inherent in determining what qualifies as a prudent investment on the part of the regulated utility.[155] They are often reluctant to allow utilities to invest in anticipation of a policy change out of concern about utility incentives to overinvest.[156] This not only exposes the utility and ratepayers to the likelihood of higher costs in the future; it may also prevent utilities from choosing safer, but more expensive, options. Furthermore, the least cost framework may prevent the utility from considering some risks altogether.

The 2012 Clean Air Act rule requiring utilities to reduce mercury emissions demonstrates ratemaking's role in risk creation. Electric utilities and PUCs were on notice that limits on power-sector mercury emissions were likely since Congress enacted the Clean Air Act in 1970.[157] That likelihood became a near certainty after Congress overhauled the hazardous air pollution requirements in the 1990 Clean Air Act Amendments,[158] putting in motion a regulatory process that

154. *FERC, Commissioner Richard Glick Dissent Regarding FERC Directing PFM to Expand Minimum Offer Price Rule*, FERC (Aug. 27, 2020), at II.D.&E, https://www.ferc.gov/news-events/news/commissioner-richard-glick-dissent-regarding-ferc-directing-pjm-expand-minimum [https://perma.cc/FNK4-P8KV] (arguing that the FERC order aims to slow the transition to clean energy and citing a "conservative" annual cost increase of $2.4 billion).

155. *See* FPL Ill. Wind, LLC, No. 2009–00545 (Ky. Pub. Serv. Comm'n June 28, 2010), 2010 WL 2640998 (rejecting an application to pass through costs for a wind power contract); *see also* Appalachian Power Co., No. PUE-2007–00068, 264 P.U.R.4th 308 (Va. State Corp. Comm'n Apr. 14, 2008), 2008 WL 1822541 (rejecting cost recovery for a proposed integrated gasification combined cycle power plant).

156. Monast, *supra* note 73, at 155 (2015).

157. Clean Air Act Amendments of 1970, Pub. L. No. 91–604, § 112, 84 Stat. 1676, 1685.

158. *See* Clean Air Act Amendments of 1990, Pub. L. 101–549, tit. I, 104 Stat. 2399 (codified at 42 U.S.C. § 7412 (1999)); *1990 Clean Air Act Amendment Summary: Title III*, U.S. EPA https://www.epa.gov/clean-air-act-overview/1990-clean-air-act-amendment-summary-title-iii [https://perma.cc/H887-HLV2] ("The Clean Air Act Amendments of 1977 failed to result in substantial reductions of the emissions of these very threatening substances. In fact, over the history of the air toxics program only seven pollutants have been regulated."). The revised Section 112 included a compromise that required the EPA to undertake a study of the

resulted in a final rule published in 2012 (the Utility MATS rule).[159] Nonetheless, many utilities and PUCs continued to view coal-fired generation as the preferred option and the public was subjected to higher mercury emissions for decades.[160] Rather than investing in technology to preemptively control emissions or shifting away from mercury-emitting fuel sources, coal-fired generation rose from approximately 55 percent of the nation's energy mix in 1970 to approximately 80 percent in the mid-1980s.[161] Coal-fired generation remained approximately 60 percent of the energy mix by 2010.[162]

Many utilities waited until the final rule before attempting to reduce mercury emissions. Section 112 of the Clean Air Act requires compliance within three years after the EPA promulgates a final rule, with the possibility of a one-year extension for individual electric generating units.[163] The short compliance timeline caused concerns about compliance costs and reliability risks, despite the ongoing signals that mercury regulations were forthcoming.[164] The PUC's traditional reluctance to hedge regulatory risk was a direct contributor to this wait-and-see approach. PUCs may have rejected proposals to proactively invest ratepayer funds to reduce emissions even if utilities were inclined to make such investments.[165] Ratemaking has contributed to higher greenhouse gas emissions and numerous other pollutants for the same reasons.

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hazards to public health resulting from the emissions of coal-fired electricity generating units, and subsequently regulate those emissions if the EPA Administrator determined that such regulation was "appropriate and necessary." 42 U.S.C. § 7412 (n)(1)(A). The EPA made such a finding in 2000. Regulatory Finding on the Emissions of Hazardous Air Pollutants from Electric Utility Steam Generating Units, 65 Fed. Reg. 79,825 (U.S. EPA Dec. 20, 2000).

159. National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units, 77 Fed. Reg. 9304-01 (Feb. 16, 2012).

160. Mercury and Air Toxics Standards: Cleaner Power Plants, *supra* note 112.

161. *Competition Among Fuels for Power Generation Driven by Changes in Fuel Prices*, U.S. ENERGY INFO. ADMIN. (July 13, 2012), https://www.eia.gov/todayinenergy/detail.php?id=7090 [https://perma.cc/2JTJ-D9S6].

162. *Id.*

163. 42 U.S.C. § 7412 (i)(3)(A)–(B). Implementation timelines are uncertain in the aftermath of the U.S. Supreme Court's 2015 holding that the EPA must consider costs when determining whether regulation under Section 112 is "appropriate and necessary." Michigan v. EPA, 576 U.S. 743, 767 (2015).

164. *See, e.g.,* Russel Ray, *Special Report: a Roundtable Discussion on Coal*, POWER ENG'G (July 1, 2012), https://www.power-eng.com/coal/special-report-a-roundtable-discussion-on-coal [https://perma.cc/9NXU-HQFQ] (discussing compliance costs and timelines for Obama-era EPA regulations affecting coal-fired power plants).

165. *See, e.g.,* Appalachian Power Co., No. PUE-2007–00068, 264 P.U.R.4th 308 (Va. State Corp. Comm'n Apr. 14, 2008), 2008 WL 1822541.

Uncertainty about the future complicates the cost minimization challenge. Utilities' resource planning may fail to adequately consider the potential cost impacts of changing circumstances. As a result, the traditional application of the least cost framework may undermine the goal of minimizing cost in the long term and contribute to public health and environmental harm in the process. Today, many utilities are retiring coal-fired power plants and increasing reliance on natural gas, creating its own set of stranded asset and pollution risks. Even if newer natural gas-fired power plants remain operating long enough for the utility to recover its construction costs, there is a danger that they could foreclose opportunities to utilize new technologies that may result in lower costs, less pollution, more efficient use of resources, and more consumer choices.[166] In either scenario, ratepayers, the general public, and potentially utilities could be worse off.[167]

In addition to influencing which risks the utility creates, ratemaking also impacts how the utility manages existing risks. For example, a recent dam collapse at a Duke Energy coal ash pond and hurricanes causing other disposal ponds to leak waste during floods forced North Carolina to address the lingering harms from aging infrastructure, inadequate environmental safeguards, and siting in floodplains.[168] The cleanup costs, and the environmental and health impacts, were created by the initial decisions to build coal-fired power plants and store the waste in open ponds.[169] Yet the costs and impacts were exaggerated by the

166. *See* Robert Walton, *Why Natural Gas Investments Could Spell Trouble for Electric Utilities*, UTIL. DIVE (Feb. 8, 2016), https://www.utilitydive.com/news/why-natural-gas-investments-could-spell-trouble-for-electric-utilities/413368 [https://perma.cc/DJF8-QLHF] (discussing potential negative impacts of cheap natural gas prices).

167. Whether or not a utility is worse off in this scenario depends on whether it is able to recover the stranded assets through mechanisms such as accelerated depreciation or securitization.

168. Tyler Dukes, *After Florence, Coal Ash Sites Near Goldsboro 'Completely Underwater'*, WRAL (Sept. 24, 2018, 12:53 PM), https://www.wral.com/after-florence-coal-ash-sites-near-goldsboro-completely-underwater-/17860975 [https://perma.cc/2TY5-JGAJ]. Duke Energy recently agreed to close all remaining coal ash ponds in North Carolina after arguing for years that some existing disposal ponds are a cost-effective and safe means for storing the coal ash. *Duke Energy Agrees to Close All Remaining Coal Ash Ponds in North Carolina*, WRAL (Jan. 2, 2020, 6:44 PM), https://www.wral.com/duke-energy-agrees-to-close-all-remaining-coal-ash-ponds-in-north-carolina/18864012 [https://perma.cc/59U5-YAR9].

169. The state has historically relied heavily on coal-fired electricity generation, and for decades unlined coal ash ponds were considered the pragmatic option for coal ash disposal. It is unlikely the PUC would have approved other more costly options for ash disposal for the older coal-fired power plants.

unwillingness of the utility and the PUC to remove the ponds even as the threats to public health and the environment became clear.[170]

The risk calculus may differ significantly depending on the stage of decision making. The PUC's approach to risk at the time of the initial investment depends on how a PUC considers the short and long-term impacts of a utility's investments. The North Carolina Utilities Commission would likely have rejected a proposal to manage coal ash differently when Duke Energy (or one of its predecessor utilities) was initially constructing the coal-fired power plants, for example. The potential harms of coal ash were not recognized when many older coal-fired power plants were constructed and there were no federal or state laws requiring different approaches.

The initial investment creates path dependencies that simultaneously create risks and limit how decision makers can address the risks. The choice to build a new natural gas pipeline, for example, makes future natural gas facilities appear more cost effective. Once the investment occurs, it is unlikely that the PUC will approve requests to replace fully functioning infrastructure unless new laws require it to do so, or new circumstances threaten the utility's ability to provide reliable power (for example, more severe storms or droughts). In the case of coal ash in North Carolina, it took action by the state's environmental agency to require the closure of the state's six remaining coal ash ponds.[171] Disputes about who should bear the costs of the cleanup—shareholders or ratepayers—continued for another two years.[172]

Ratemaking may also incentivize utilities to prioritize capital investments rather than maintenance, as maintenance costs are generally not eligible for the rate of return. Seeking higher rates for expenses that do not qualify for the rate of return could mean less opportunity for the utility to invest in areas that benefit shareholders.[173] Even though they could pass the costs on to consumers, the

170. The U.S. Environmental Protection Agency cited 157 "proven and potential" instances of coal ash harming human health and the environment in its proposed 2015 coal ash residuals rule. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities, 80 Fed. Reg. 21,302, at 21,325 (U.S. EPA Apr. 17, 2015).

171. Settlement Agreement, Duke Energy Carolinas, LLC v. N.C. Dept. of Env. Quality (Dec. 31, 2019), https://files.nc.gov/ncdeq/Coal%20Ash/2020-closure/Final-Agreement-12–31–19.pdf [https://perma.cc/GRY2-JSFP].

172. Catherine Morehouse, *Duke Coal Ash Clean Up Settlement Shifts $1.1B in Costs Away From North Carolina Ratepayers*, UTIL. DIVE (Jan. 26, 2021), https://www.utilitydive.com/news/duke-coal-ash-clean-up-settlement-shifts-11b-in-costs-away-from-north-car/593925 [https://perma.cc/BW6Q-CLRF].

173. Katharine M. Mapes, Lauren L. Springett & Anree G. Little, *Retooling Ratemaking: Addressing Perverse Incentives in Wholesale Transmission Rates*, 42 ENERGY L.J. 339 (2021) (explaining

resulting higher costs could reduce their ability to maximize shareholder value in other ways.

III. A PRECAUTIONARY APPROACH TO RATEMAKING

Lawmakers can amend state statutes to expand the PUC's mandate and allow alternative approaches to ratemaking. For example, legislatures in Maine, Massachusetts, and Maryland adopted new laws in 2021 formally requiring their respective utilities commissions to consider greenhouse gas emissions.[174] Some states have authorized PUCs to approve performance-based rate setting that compensates utilities for achieving performance criteria rather than for capital investments.[175] Other states have altered the PUC's approach to least cost planning, such as California's least cost, best fit analysis that allows consideration of societal benefits in addition to the cost.[176] States can authorize PUCs to remove some expenditures from the traditional ratemaking process, such as a recent Florida law allowing the PUC to implement a separate three-year compensation process to harden utility infrastructure (burying power lines) due to increased threats from storms.[177]

Legislatures may also change the least cost calculation by requiring utilities to consider environmental impacts in their long-term planning processes.[178]

utilities' "perverse incentive to inappropriately reduce operating expenses so as to increase profits").

174. An Act to Require Consideration of Climate Impacts by the Public Utilities Commission and to Incorporate Equity Considerations in Decision Making by State Agencies, 2021 Me. Laws Ch. 279, http://www.mainelegislature.org/legis/bills/display_ps.asp?ld=1682&PID=1456&snum=130 [https://perma.cc/GAP9-QRAG]; 2021 Mass. Acts Ch. 8 (S.B. 9), https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8; Utility Regulation - Consideration of Climate and Labor, 2021 Md. Laws Ch. 614 (H.B. 298), https://mgaleg.maryland.gov/mgawebsite/Legislation/Details/HB0298 [https://perma.cc/87FG-GTG9].

175. Chloe Holden, *More States Explore Performance-Based Ratemaking, but Few Incentives Are in Place*, GREENTECH MEDIA (June 13, 2019), https://www.greentechmedia.com/articles/read/more-states-explore-performance-based-ratemaking-but-few-incentives-in-plac [https://perma.cc/2N72-CSVM].

176. Jeff Guldner & Meghan Grabel, *Dealing With Change: The Long-Term Challenge for the Electric Industry*, 23 NAT. RES. & ENV'T 3, 6 (2008).

177. *PSC Moves Forward With Storm Protection Rules*, FLA. PUB. SERV. COMM'N (Nov. 5, 2019), http://floridapsc.com/Home/NewsLink?id=11797 [https://perma.cc/X5B4-A9RL].

178. The new considerations often occur within the context of the least cost resources. *See, e.g.*, Commonwealth Edison Co., No. 90–0038, 1990 WL 508139 (Ill. Com. Comm'n Dec. 12, 1990) (discussing a state statute requiring the Illinois Commerce Commission to adopt a resource plan that "'will result in the greatest likelihood of providing adequate, efficient, reliable and environmentally safe energy services at the least cost to consumers, and which utilizes to the

Alternatively, state laws may require utilities to invest in certain types of energy regardless of the cost. More than half of the states have enacted renewable portfolio standards that require a minimum amount of electricity sold to end users to come from renewable energy sources.[179] Today, wind and solar can increasingly compete with other electricity generation options based on cost alone, but that was not true when states adopted the portfolio standards. Some states have implemented energy efficiency mandates.[180] Seven states and the District of Columbia have committed to carbon-free electricity systems by the middle of the century.[181]

Risk-based governance is a model for transforming the role of the PUC without requiring new statutory authority. In contrast to the traditional economic regulator model, risk governance can counterbalance the PUC's focus on cost and reinvigorate its public interest role. This would allow PUCs to proactively facilitate electricity sector planning and operations rather than reacting to decisions by other agencies or shifting market forces. Indeed, a failure to take a broader view could run counter to the PUC's obligations to pursue least cost options as the electricity system evolves.[182]

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fullest extent practicable, all economical sources of conservation, renewable resources, cogeneration and improvements in energy efficiency as the primary sources of new energy supply'"); *see also* Least Cost Integrated Res. Planning, 98 P.U.R.4th 115 (N.C. Utils. Comm'n Dec. 8, 1988) (finalizing an order requiring utilities to undertake least cost integrated resource plans, including an annual report identifying opportunities to improve environmental quality).

179. Jocelyn Durkay, *State Renewable Portfolio Standards and Goals*, NAT'L CONF. OF STATE LEGISLATURES (Aug. 1, 2017), http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx [https://perma.cc/7RBL-FHRS]. Utilities may satisfy their RPS obligations by investing directly in qualifying renewable facilities or purchasing renewable energy credits that represent one-megawatt hour of qualifying renewable energy generation. RENEWABLE ENERGY EXPLAINED: PORTFOLIO STANDARDS, U.S. ENERGY INFO. ADMIN. (Nov. 18, 2019), https://www.eia.gov/energyexplained/renewable-sources/portfolio-standards.php [https://perma.cc/SQ67-EGJ5].

180. DANIEL STEINBERG & OWEN ZINAMAN, NAT'L RENEWABLE ENERGY LAB'Y, STATE ENERGY EFFICIENCY RESOURCE STANDARDS: DESIGN, STATUS, AND IMPACTS 3–4 (May 2014), https://www.energy.gov/sites/prod/files/2017/01/f34/State%20Energy%20Efficiency%20Resource%20Standards%20Design%2C%20Status%2C%20and%20Impacts.pdf [https://perma.cc/VF9P-FCSW] (summarizing the status of state energy efficiency resource standard policies).

181. Maine and New York Become the 6th and 7th States to Adopt 100% Clean Electricity Targets, U.S. ENERGY INFO. ADMIN. (Sept. 26, 2019), https://www.eia.gov/todayinenergy/detail.php?id=41473 [https://perma.cc/N9X2-DAJ8].

182. *See, e.g.*, KONSCHNIK, ROSS, MONAST, WEISS & WILSON, *supra* note 137, at 24–25 (finding that "[b]y 2043, all climate policies result in lower monthly residential bills than the baseline—in part because of a stronger shift into renewables which have no fuel costs").

A broader view of the costs and risks facing the electricity sector would consider the social and environmental impacts of a utility decision, as well as how those decisions could impact rates. Considering the health impacts of mercury emissions and the likelihood that higher regulatory costs in the future could have tilted the scales against a new coal-fired power plant in favor of another option that hedged risk and improved public health.[183] The failure to consider these issues skewed many utilities' long-term planning in favor of coal over the past couple of decades. Many of those coal units are now uneconomic, or soon will be, leading commissions to authorize early depreciation or securitization to allow utilities to recover their capital costs before retiring the units early.[184] Traditional ratemaking pushed utilities to make these choices and now protects them from the downside risks when situations change.

A risk-based approach that accepts higher near-term costs may trigger a more exacting judicial review, and the PUC's success would depend upon the justifications showing that connection between the cost increases and the traditional ratemaking focus on maintaining lower rates over a longer time frame. However, if the PUC justifies decisions that improve social goals based on traditional economic considerations, courts should uphold the valid exercise of the PUC's discretion.

This Part proposes a framework for expanding the least cost approach to ratemaking. The proposed framework—a least cost-least risk approach—builds upon the precautionary principle, a governance principle that aims to reduce harms to society caused by uncertainty and risk. The discussion then provides tangible examples to demonstrate how a least risk precautionary approach would improve traditional ratemaking. This Part concludes by recognizing that a more robust risk-based ratemaking framework does not mean that PUCs should attempt to avoid all risk or should abandon its focus on system costs. Wildfire risk is far from the only source of rate increases linked to public interest considerations in California, for example, and utilities are not the only source of that risk. Overspending to eliminate the potential for a utility's infrastructure to spark a fire would not eliminate the risk of wildfire. Furthermore, states have additional policy goals that may also result in rate

183. Robert L. Glicksman, *Coal-Fired Power Plants, Greenhouse Gases, and State Statutory Substantial Endangerment Provisions: Climate Change Comes to Kansas*, 56 U. KAN. L. REV. 517, 550–52 (2008) (discussing shifting PUC viewpoints on coal-fired generation).

184. *See, e.g.*, Scott Patterson, *Utilities Pay for Coal-Plant Closures by Issuing Bonds*, WALL ST. J. (July 9, 2021), https://www.wsj.com/articles/utilities-pay-for-coal-plant-closures-by-issuing-bonds-11625828400 [https://perma.cc/UUE4-QUNU] (explaining how securitization is "helping electric utilities shut down money-losing coal-fired power plants, cutting greenhouse gas emissions and often lowering costs for consumers").

increases, requiring policymakers to balance these goals with the need to maintain affordable electricity. Nonetheless, the precaution-based approach would allow PUCs to assess where risk and uncertainty can translate to significant cost for ratepayers, and where there are cost-effective alternatives to meet immediate system needs, utilities commissioners should prioritize the least risk pathway.

A. Precautionary Ratemaking in Theory

There is a voluminous body of scholarship on the precautionary principle and numerous definitions of the principle itself.[185] Some scholars argue that precaution is best suited to situations where there is the potential for catastrophic harm.[186]

Some argue that application of the precautionary principle can be tailored to specific circumstances,[187] while others claim that the principle is unworkable or too vague for regulators to apply.[188] This Article does not attempt to analyze which definitions are correct, but rather uses the general framing of precaution to inform ratemaking. Despite disagreement on specific applications, the precautionary principle, at its core, seeks to avoid unnecessary harm to society when risk is uncertain or difficult to quantify.[189] Applying the principle generally shifts the

185. *See, e.g.*, Jonathan Remy Nash, *Standing and the Precautionary Principle*, 108 COLUM. L. REV. 494, 500–01 (2008); Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1011 (2003) (pointing out that some definitions are at odds with one another). Application of the principle to energy tends to occur in the context of nuclear energy and environmental concerns such as climate change. *See, e.g.*, Daniel A. Farber, *Uncertainty*, 99 GEO. L.J. 901, 953 (2011); Cass R. Sunstein, *Irreversible and Catastrophic: Global Warming, Terrorism, and Other Problems: Eleventh Annual Lloyd K. Garrison Lecture on Environmental Law*, 23 PACE ENV'T. L. REV. 3, 9 (2006) (discussing tradeoffs between risks associated with nuclear power and risks associated with climate change).

186. Farber, *supra* note 185, at 919.

187. Sarah E. Light, *Precautionary Federalism and the Sharing Economy*, 66 EMORY L.J. 333, 346 (2017).

188. John S. Applegate, *The Taming of the Precautionary Principle*, 27 WM. & MARY ENV'T. L. & POL'Y REV. 13, 15–16 (2002) ("One of the principal criticisms of the precautionary principle is its indefiniteness.").

189. For example, according to Professor Jonathan Nash, "[i]n its essence, the precautionary principle calls for exercise of caution in the face of risk and uncertainty." Jonathan Remy Nash, *Standing and the Precautionary Principle*, 108 COLUM. L. REV. 494, 498 (2008). The Hastings Center's Gregory Kaebnick and Michael Gusmano provide a more detailed definition, stating that:

> [Precaution is] usually understood as a principle or rule that should guide policy-making where there is a possibility of harm but uncertainty about it, where uncertainty is understood not just in terms of uncertainty about the

burden of proof about potential harms from opponents of an action to the actor proposing the action.[190]

At first blush, the connection between the precautionary principle and ratemaking may not be immediately apparent. The precautionary principle often arises when there is not enough information to quantify risks and where the potential risks may be severe, irreversible, or both.[191] On the surface, ratemaking is primarily concerned with the price of electricity and the returns for the utility and its investors. Some of the risks with ratemaking, including many of the public health impacts, are known and quantifiable.[192] Society may accept these known impacts in exchange for lower electricity rates, in contrast to circumstances where a new technology may pose unknown, potentially severe, and potentially irreversible harms. On closer examination, however, there are important similarities between many of the risks created by, and impacting, electric utilities (climate change, wildfires, storm response, air and water quality, infrastructure siting, cybersecurity attacks on energy infrastructure) and the types of circumstances that led to calls for precaution. There is also significant uncertainty regarding technology development, electricity demand, stranded asset risks, and regulatory changes. Failure to manage these risks may have persistent financial, health, and environmental consequences.

The precaution-based approach proposed here starts with the current goals of ratemaking: avoiding risks that may cause unreasonably high prices, undermine reliability, threaten the financial viability of the utility, or undermine reasonable investor expectations. A precautionary approach to infrastructure investments in areas subject to catastrophic wildfires and storms may accept higher costs for more resilient or less risky alternatives, for example.[193] Similarly, avoiding the risk that

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likelihood but also about the meaning and weight of outcomes and the range of potential outcomes.

GREGORY E. KAEBNICK & MICHAEL K. GUSMANO, CBA AND PRECAUTION: POLICY-MAKING ABOUT EMERGING TECHNOLOGIES, HASTINGS REP., S88, S89 (2018), https://doi.org/10.1002/hast.824 [https://perma.cc/B5QP-6ETP].

190. Light, *supra* note 187.

191. *See generally* Miguel A. Recuerda, *Dangerous Interpretations of the Precautionary Principle and the Foundational Values of European Food Law: Risk Versus Risk*, 4 J. FOOD L. & POL'Y 1, 3–4 (2008) (comparing to the principle of prevention which would apply to "risks that can be quantified in probabilistic terms").

192. *See generally*, U.S. EPA, REGULATORY IMPACT ANALYSIS FOR THE FINAL MERCURY AND AIR TOXICS STANDARDS, EPA-452/R-11–011 (Dec. 2011), https://www3.epa.gov/ttnecas1/regdata/RIAs/matsriafinal.pdf [https://perma.cc/N2Y6-SELL].

193. *See, e.g., PG&E Will Bury 10,000 Miles of Power Lines So They Don't Spark Wildfires*, NPR (July 21, 2021 10:46 PM), https://www.npr.org/2021/07/21/1019058925/utility-bury-power-lines-wildfires-california [https://perma.cc/X8Q4-FA9R] (reporting a projected cost of $15–30

new technologies could create multibillion dollar stranded assets could lead a PUC to prioritize resources with lower construction costs, quicker construction timelines, or less environmental impact even if the initial costs appear higher on a strictly economic basis.[194] The key difference is the scope of risk that the PUC considers, and how it balances the goal of risk minimization with the established principle of least cost.

A precautionary approach to ratemaking can also help improve social outcomes or, at minimum, seek to avoid exacerbating harms through ratemaking. There is no federal or state regulator that considers electricity sector risks and tradeoffs in a comprehensive manner.[195] State environmental regulators and the U.S. Environmental Protection Agency (EPA) focus on air quality and water quality impacts of power generation. FERC focuses on interstate wholesale electricity transactions, natural gas pipelines, and, to a limited extent, interstate transmission lines. State PUCs set electricity rates and oversee grid reliability. Local planning authorities focus on siting, but their authority may be limited by state or federal preemption. Of all the agencies involved in the governance of the electricity sector, the PUC is in the best position to consider the full scope of economic, social, and environmental impacts before acting.[196] The PUC already compares the costs and benefits of an action and evaluates risk tradeoffs associated with a proposed course of action, albeit in a limited manner. Although it cannot mitigate all risks posed by the electricity system, it is in the best position to address the broad range of risks and consider alternatives.

Minimizing these risks with precautionary ratemaking should include three steps. First, PUC commissioners should engage in broad, robust risk analysis that

billion to bury powerlines in fire-prone areas, with "most of the costs … likely [to] be shouldered by PG&E customers, whose electricity rates are already among the highest in the U.S").

194. BEN CALDECOTT, GERARD DERICKS, ALEXANDER PFEIFFER & PABLO ASTUDILLO, STRANDED ASSETS: THE TRANSITION TO A LOW CARBON ECONOMY OVERVIEW FOR THE INSURANCE INDUSTRY 17–18 (2017).

195. Peter Huber, *Electricity and the Environment: In Search of Regulatory Authority*, 100 HARV. L. REV. 1002, 1054 (1987).

196. *See, e.g.*, FLA. ADMIN. CODE ANN. r. 25-22.081. Florida requires that petitions for approval of new power plants must provide information that allows:

> [T]he Commission to take into account the need for electric system reliability and integrity, the need for adequate reasonable cost electricity, the need for fuel diversity and supply reliability, the need to determine whether the proposed plant is the most cost effective alternative available, and the need to determine whether renewable energy sources and technologies, as well as conservation measures, are utilized to the extent reasonably available.

Id.

draws upon existing risk assessment tools such as environmental agencies' emissions modeling, social cost analysis, real options analysis, and minimizing regret scenario planning.[197] Second, the PUC should use multiple risk analyses to prioritize strategies that minimize economic, environmental, and social impacts. The analysis should also consider potential effects on system reliability and affordability, and balance near-term and longer-term costs and benefits. Third, the PUC should ensure that ratemaking does not hinder the utility's ability to adopt beneficial technologies as they emerge, which may include delaying investments or investing in smaller projects with quicker construction and depreciation schedules.

The first step is the most significant expansion of the ratemaking process, but the final step may have the most significant impact on risk minimization and decision making under uncertainty. Each investment in capital infrastructure creates path dependency for an electric utility. Building a new power plant in anticipation of future growth in electricity demand forecloses the opportunity to consider newer technologies available when demand actually increases. Building a natural gas pipeline makes natural gas-fired generation more likely, particularly if the gas pipeline were built in lieu of a transmission line that could have transported electricity from new renewable energy facilities.[198] A failure to invest in smart grid technologies may make a utility more likely to oppose small scale renewable energy due to grid management challenges.

Once the utility begins construction, it is not possible to reverse the decision and recover the investment if circumstances change. Someone must pay, and usually it will be the ratepayers. South Carolina ratepayers have learned that lesson the hard way, as the state is still struggling to address the $9 billion spent on a canceled nuclear power plant.[199]

A common criticism of the precautionary principle argues that delaying action to gather additional information may be an intuitive response in new circumstances when there is the potential for significant harm, but it is challenging to apply because it may not be clear when there is enough information to justify a

197. *See generally* DAVID HOPPOCK, DALIA PATINO ECHEVERRI & SARAH ADAIR, ASSESSING THE RISK OF UTILITY INVESTMENTS IN A LEAST-COST-PLANNING FRAMEWORK, 7–18 (Nov. 2013).

198. *See generally* James W. Coleman, *Pipelines & Power-lines: Building the Energy Transport Future*, 80 OHIO ST. L.J. 263 (2019).

199. Avery G. Wilks & Andrew Brown, *3 Years Later: How the Fallout From SC's $9 Billion Nuclear Fiasco Continues*, POST & COURIER (July 31, 2020), https://www.postandcourier.com/business/3-years-later-how-the-fallout-from-scs-9-billion-nuclear-fiasco-continues/article_5d2a2684-d264-11ea-946f-935bbd3ffa98.html [https://perma.cc/YEC6-2W6Z].

decision or who should make the final decision.[200] Additionally, action may be necessary to assess the risks, yet precaution can lead to paralysis and prevent social progress.[201] Under this formulation, the regulator imposes significant costs on industries in an effort to prevent potential risks that might have minuscule probabilities of occurrence. This kind of overregulation creates its own substitute risks by potentially "depriv[ing] society of significant benefits," which is counterproductive to the principle's intended purpose.[202]

These criticisms need not apply to precautionary ratemaking. A precautionary approach to ratemaking would establish a presumption that policymakers should avoid actions that could lead to irreversible negative effects, such as canceled construction projects, fuel price volatility, increased or regulatory costs, or public health harms. It would not, however, require certainty before acting. Reliability and affordability would remain core principles and require the PUC to act when necessary. State and federal laws would not allow, and utility customers would not accept, solutions that do not keep the power on or make electricity unaffordable.

Inaction may not be an option for PUCs and electric utilities, but how a utility proceeds remains a critical question, particularly during a period when the electricity system is evolving quickly and in ways that are difficult for economic analysis to capture. A long-term view of costs and risks could allow a PUC to justify near-term cost increases if they are likely to result in social benefits and lower long-term prices by avoiding factors such as new regulations or higher fuel costs that may increase rates. There may be compelling reasons to hedge against potential increases in operating costs and capital expenditures in the future. As discussed above, the electricity sector is in the midst of a transition. Coal plants are retiring, and utilities are replacing them with a combination of natural gas and renewable energy. With the technology and federal regulations in flux at a time when utilities are making new investments, long-term affordability and reliability depend on a utility's ability to hedge the risk of changing market conditions and public policy.[203] PUCs could authorize the utility to invest in a more expensive option in the near-term in anticipation of new regulations. Conversely, PUCs could expect

200. Mark Geistfeld, *Implementing the Precautionary Principle*, 31 ENV'T. L. REP. NEWS & ANALYSIS 11326, 11326 (2001).

201. Noah M. Sachs, *Rescuing the Strong Precautionary Principle From Its Critics*, 2011 U. ILL. L. REV. 1285, 1316 (2011); Sunstein, *supra* note 185, at 1003 (stating that "this strong form" of the precautionary principle "should be rejected, not because it leads in bad directions, but because it leads in no direction at all.").

202. Sunstein, *supra* note 185, at 1023.

203. *See, e.g.,* Monast, *supra* note 73, at 154.

utilities to delay large capital investments in the near-term, allowing more time for new technologies to emerge. Both are legitimate hedging strategies but are counter to the utility's incentive to invest capital in pursuit of shareholder returns.

The extent to which a commission in a particular state can expand the criteria considered depends on state and federal law. But even where PUCs are limited by existing law, a robust risk analysis that includes social and environmental impacts that may raise rates in the future can help commissioners more effectively evaluate different alternatives, transparently justify their ratemaking decisions, and identify potential risks resulting from the decisions. This transparency can then inform future public policy choices or allow stakeholders and policymakers to conclude that the PUC's application of the law results in an acceptable level of risk.

B. Precautionary Ratemaking in Practice

PUCs already use risk avoidance strategies in many respects. They are often reluctant to approve investments in anticipation of policy changes, preferring instead to react once new requirements are known.[204] They react to reliability concerns by erring on the side of oversupply rather than undersupply.[205] Utilities and PUCs are historically risk averse regarding fuels, seeking to avoid heavy reliance on fuels with a risk of large price variability.[206] Utilities and PUCs also

204. For example, in 2014 the North Carolina Utilities Commission denied Duke Energy's request to include the cost of carbon within the commission's avoided cost calculation because "[w]hile the EPA has proposed to regulate CO2 under the Clean Air Act . . . [t]he end result of the proposed regulations is speculative at best[.] . . . [Q]uantifying actual out-of-pocket avoided costs is problematic enough without introducing unknown environmental costs into the equation." Duke Energy Progress, LLC, No. E-100, SUB 140 (N.C. Util. Comm'n Dec. 31, 2014), https://starw1.ncuc.gov/ncuc/ViewFile.aspx?Id=4d85c17b-ef0a-4dc4-a0fd-c84d4f39ef80 [https://perma.cc/N88R-4QW3].

205. *See* Duke Energy Progress, LLC, No. E-2, SUB 1089 (N.C. Util. Comm'n Jan. 26, 2016), at 10–12, 43, https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=50df4b08-ae5f-41c9-a1bd-8c26685673c2 [https://perma.cc/4QJN-R2BF] (approving the construction of a new natural gas-fired power plant despite assertions that the utility's projected load growth was inaccurate and that supply needs could be met by energy imports rather than constructing a new facility).

206. For example, in the early 2000s prior to the shale gas boom, the price of natural gas oscillated between $2 per thousand cubic feet (Mcf) and $5 per Mcf, leading utilities to invest in generating options with more consistent pricing such as coal or nuclear power. ZHONGMIN WANG & ALAN KRUPNICK, US SHALE GAS DEVELOPMENT: WHAT LED TO THE BOOM? 10 (2013); *see, e.g.*, U.S. ENERGY INFO. ADMIN., U.S. COAL-FIRED ELECTRICITY GENERATION IN 2019 FALLS TO 42-YEAR LOW (2020), https://www.eia.gov/todayinenergy/detail.php?id=43675 [https://perma.cc/6VD7-DTF2].

tend to be risk averse when it comes to new technologies, preferring proven technologies with predictable construction costs and certainty regarding reliability rather than betting on innovative technologies.[207] There is a high price if an expensive technology fails, such as the canceled nuclear units in South Carolina or the unsuccessful attempt to construct a coal gasification plant with carbon capture in Mississippi.[208]

A recent decision by the Indiana Utility Regulatory Commission rejecting a utility plan for a new $900 million, 850-megawatt natural gas-fired power plant is a form of least cost-least risk decision making in action. The commission cited concerns about stranded assets due to falling costs of renewable energy and conflicting electricity demand projections:[209]

> The preapproval of long-lived power plant investment and the concurrent regulatory assurance of that investment's recovery is, at its base, the creation of fixed costs that customers will be required to pay several years into the future, perhaps as long as 30 years or more into the future. Accordingly, our consideration in this and other pre-approval requests, especially in periods of seemingly quickening technological change, must not ignore the risk that any such investment may become uneconomic over the

207. Jonas J. Monast & Sarah K. Adair, *Completing the Energy Innovation Cycle: The View From the Public Utility Commission*, 65 HASTINGS L.J. 1345, 1348–52 (2014).

208. Menqi Sun, *The $4.7 Billion Nuclear Bill That No One Wants to Pay*, WALL ST. J. (Aug. 25, 2018) https://www.wsj.com/articles/the-4-7-billion-nuclear-bill-that-no-one-wants-to-pay-1535194801 [https://perma.cc/X49H-7S47] (describing the tension between South Carolina Electric & Gas Co. and state lawmakers as to whether ratepayers should bear the cost of the abandoned Virgil C. Summer nuclear plant); Krysti Shallenberger, *Mississippi Regulators Approve Kemper Settlement, Affirming End to Ratepayer Recovery*, UTIL. DIVE (Feb. 6, 2018) https://www.utilitydive.com/news/mississippi-regulators-approve-kemper-settlement-affirming-end-to-ratepaye/516450 [https://perma.cc/3V7X-YH6J] (detailing the settlement between Mississippi Power and the Mississippi Public Service Commission over the failed Kemper coal gasification plant). The DOJ later opened an investigation into Mississippi Power for the failed plant, as it had received $387 million in federal grants for the project. Robert Walton, *DOJ Opens Investigation Into Kemper Plant as Southern Warns of Possible 'Material Impact'*, UTIL. DIVE (May 2, 2019) https://www.utilitydive.com/news/doj-opens-investigation-into-kemper-plant-as-southern-warns-of-possible-ma/553936 [https://perma.cc/BJS9-FF5M].

209. Vectren Energy Delivery of Indiana, Inc. ("Vectren South"), No. 45052 (Ind. Util. Regul. Comm'n Apr. 24, 2019), at 21, 28, https://iurc.portal.in.gov/_entity/sharepointdocumentlocation/4dfb39e0-9f66-e911-8151-1458d04ef938/bb9c6bba-fd52-45ad-8e64-a444aef13c39?file=45052_ord_20190424102046480.pdf (finding that considering "a broader spectrum of resource options would have also gone a long way to improve the metrics to limit risks from exposure to changes in market conditions and technologies").

> long-term.[210] . . . Because unwinding assured cost recovery should an asset become uneconomic is not a commonly employed regulatory option, it is prudent to ensure during the pre-approval process that we understand and consider the risk that customers could sometime in the future be saddled with an uneconomic investment. . . It seems straightforward to suggest that smaller-scale options . . . serve to minimize the risk should a challenge arise at any one option.[211]

Here, the Indiana Utility Regulatory Commission responded to risk and uncertainty by delaying decisions until there is better information (on regulation, fuel markets, technologies), avoiding actions that may have negative financial consequences, and generally choosing alternatives with known tradeoffs.

A hypothetical scenario using circumstances facing electricity sector decision makers helps further illustrate how precautionary ratemaking would differ from traditional ratemaking. Assume that electricity demand projections are uncertain, primarily due to uncertainty regarding the adoption of electric vehicles. In addition, electricity demand recently dropped sharply due to a pandemic and it is unclear whether the decline is temporary or long-term. The area has infrequent cold snaps, but periodically experiences winter vortexes that cause spikes in electricity demand in the early morning hours. The cost of energy storage technologies is falling dramatically but remains expensive. Storage costs may follow the trajectory of solar panels and continue the sharp decline, or they may level off. If costs continue to decline, storage could transform the role of renewable energy, exponentially expanding access to a pollution free generation with known upfront construction costs, no fuel costs, and minimal maintenance costs.

Investing in natural gas-fired generation would likely be the conventional choice in these circumstances. Natural gas-fired power plants provide power when needed (as opposed to solar or wind energy), provided they have access to a stable fuel supply. Natural gas prices are projected to remain relatively stable for the foreseeable future. Building a natural gas plant is relatively quick and straightforward.

Natural gas plants emit carbon dioxide, nitrogen oxides, and other pollutants, however, and are thus vulnerable to increased regulatory costs. Increasing natural gas-fired generation may require new pipelines, which are often

210. *Id.* at 20–31 (concluding "that Vectren South's risk analysis does not adequately consider the relative risk of other methods for providing reliable, efficient, and economical electric service").
211. *Id.* at 22, 28.

controversial and subject to delays and cost overruns.[212] The recently canceled Atlantic Coast Pipeline is a cautionary tale, as the utilities developing the project had already spent $3.4 billion on the project by the time it was canceled, and cancelation was blamed on ballooning costs, regulatory delays, and lawsuits.[213] In addition, the construction of large power plants may crowd out opportunities for new energy technologies, particularly if utilities overbuild natural gas infrastructure.

Alternatively, the PUC could consider meeting seasonal needs by contracting for power outside the utility, relying on competitive procurement to meet seasonal electricity needs, or increasing the role of demand response (generally, payments to electricity consumers to reduce demand for electricity rather than paying the utility to generate electricity). These options may conflict with the utility's business model and require PUCs to consider alternate strategies to compensate the utility for beneficial services provided to customers, but they could also lead to tangible financial and health benefits for ratepayers and the general public.

The PUC could also consider smaller-scale investments to meet immediate needs but preserve options in case circumstances change that would affect the cost-effectiveness of the natural gas option. For example, renewable generation plus battery storage may be more expensive than generating the same amount of electricity from a natural gas-fired power plant. However, accounting for the environmental and public health benefits of renewable energy, the absence of fuel costs and emissions subject to increasing regulatory limits, and the ability to scale renewable energy generation based on current and future needs could tilt the scale toward the renewable energy option under a least risk analysis.

Engaging in this analysis does not require the PUC to automatically reject the conventional option. A least risk approach would not prohibit new natural gas-fired power plants, but a more robust decisionmaking process that weighs risks and values will provide the PUC with a more complete understanding of the implications of its choices.

212. Rachel Adams-Heard & Ellen M. Gilmer, *Grim Day for Pipelines Shows They're Almost Impossible to Build*, BLOOMBERG (July 6, 2020), https://www.bloomberg.com/news/articles/2020-07-06/demise-of-gas-project-shows-u-s-pipelines-becoming-unbuildable [https://perma.cc/6CJ2-3DPH] (discussing challenges with pipeline construction).

213. Michael Martz, *Dominion Cancels Atlantic Coast Pipeline, Sells Natural Gas Transmission Business*, RICHMOND TIMES-DISPATCH (July 5, 2020), https://richmond.com/news/virginia/dominion-cancels-atlantic-coast-pipeline-sells-natural-gas-transmission-business/article_340549bd-cd01-57f1-9167-86b6ee406f02.html [https://perma.cc/VG77-U3ZQ].

PUCs can implement the least cost-least risk framework at different stages. Commissions can anticipate and avoid risks when considering proposals to invest in new infrastructure. A precautionary approach can also act as an iterative process that evaluates emerging risks, such as those posed by climate change, and legacy risks, such as coal ash storage, recognizing that mitigating legacy risks may require new investments, but the failure to make the investments does not eliminate the potential cost to ratepayers, the utility, and society as a whole.

CONCLUSION

Ratemaking will determine how electric utilities respond to many of society's most pressing challenges: climate change, wildfires, storm response, air and water quality, infrastructure siting, and cybersecurity. The ratemaking process often limits or excludes consideration of these many current and future risks, which in turn restricts a utility's response.

Adopting a least cost-least risk framework allows utilities commissioners to take a direct role in evaluating a broad range of risks tied to utility actions and pursuing a welfare-maximizing outcome that is most likely to meet current system needs, avoid creating risks that limit future choices, and preserve options for incorporating beneficial technologies as they emerge. Adopting a precautionary approach, therefore, improves social and environmental outcomes, while also enhancing a PUC's ability to achieve its central mandates.