

Docket No. UE 433
Exhibit PAC/500
Witness: Robert S. Mudge

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

PACIFICORP

Direct Testimony of Robert S. Mudge

February 2024

TABLE OF CONTENTS

I. INTRODUCTION AND QUALIFICATIONS1
II. PURPOSE OF TESTIMONY AND SUMMARY CONCLUSIONS2
III. REGIONAL WILDFIRE RISK AND COST ARE GROWING6
IV. WILDFIRE MITIGATION CAN’T REASONABLY ELIMINATE ALL RISK..... 15
V. POTENTIAL REGULATORY RELIEF20
 A. Recovering Higher Commercial Insurance Costs 22
 B. Protection From Extreme Events29
VI. CONCLUSION.....34

ATTACHED EXHIBITS

Exhibit PAC/501—Statement of Qualifications

Exhibit PAC/502—Area Burned from Human Caused Wildfires in the West

Exhibit PAC/503—Costs of +\$1 Billion Wildfires in the United States

Exhibit PAC/504—Recent Costs of Wildfire Insurance Faced by Regional Utilities

Exhibit PAC/505—Recent Wildfire Insurance Cost Recovery Settlements Achieved by
Regional Utilities

1 **I. INTRODUCTION AND QUALIFICATIONS**

2 **Q. Please state your name, position, and business address.**

3 A. My name is Robert S. Mudge. I am a Principal at The Brattle Group (Brattle), an
4 international consulting firm providing planning, policy analysis, and valuation
5 support in energy and regulatory economics, commercial litigation support, and
6 competition analysis. My business address is 1800 M Street NW, Suite 700 North,
7 Washington, DC 20036.

8 **Q. On whose behalf are you submitting this direct testimony?**

9 A. I am submitting this direct testimony before the Public Utility Commission of Oregon
10 (Commission) on behalf of PacifiCorp d/b/a/ Pacific Power (PacifiCorp or Company).

11 **Q. Please describe your education and professional experience.**

12 A. I am a former investment and commercial banker, consulting to various energy clients
13 on issues relating to valuation, liquidity, corporate restructuring, contract terminations
14 or amendments, special capital needs, acquisitions and divestitures, and the cost of
15 capital. I also have practical experience as a Chief Financial Officer having served in
16 that role for Brattle for several years. I received an M.B.A. in Finance and Economics
17 from the University of Chicago Graduate School of Business and a B.A. from
18 Harvard College.

19 I co-authored a white paper in 2018 describing the asymmetric nature and
20 estimated cost of wildfire damage cost exposure, which my colleague, Frank C.
21 Graves, introduced in testimony on behalf of Pacific Gas and Electric Company
22 (PG&E) (FERC Docket No. ER19-13-000). The 2018 white paper was augmented in
23 2019 by an additional analysis to reflect the new terms and conditions for wildfire

1 damages funding under California Assembly Bill 1054 (AB 1054). I testified jointly
2 with Mr. Graves on these matters on behalf of both PG&E and Southern California
3 Edison (SCE) before the California Public Utilities Commission (CPUC) in
4 September 2019.

5 I have attached as Exhibit PAC/501 a statement of qualifications that further
6 details my background and professional experience. I am also sponsoring the
7 following exhibits:

8 Exhibit PAC/502—Area Burned from Human Caused Wildfires in the West

9 Exhibit PAC/503—Costs of +\$1 Billion Wildfires in the United States

10 Exhibit PAC/504—Recent Costs of Wildfire Insurance Faced by Regional Utilities

11 Exhibit PAC/505—Recent Wildfire Insurance Cost Recovery Settlements

12 Achieved by Regional Utilities

13 **Q. Have you appeared as a witness in previous regulatory proceedings?**

14 A. Yes. I have testified before other public utility commissions in Alaska, Alberta,
15 California, Illinois, Kentucky, Massachusetts, Michigan, and Missouri.

16 **II. PURPOSE OF TESTIMONY AND SUMMARY CONCLUSIONS**

17 **Q. What is the purpose of your direct testimony in this case?**

18 A. The purpose of my testimony is to provide context for current PacifiCorp initiatives
19 to manage the growing risk of financial exposure to wildfire-related liabilities as
20 described in the testimony of Company witness Joelle R. Steward. These initiatives
21 include seeking approval for the following:

22 1. An Insurance Cost Adjustment that will recover the increased costs for excess
23 liability insurance and enable the Company to annually procure insurance for

1 third-party liability using the most economical combination of commercial
2 insurance and self-insurance through a new Insurance Mechanism that the
3 Company is developing, and

4 2. A Catastrophic Fire Fund that will facilitate creation of a multi-state risk pool
5 for potential catastrophic events where third-party liabilities are in excess of
6 the Company's insurance coverage.

7 Toward this objective, I review indicia of increased wildfire risk affecting the
8 Western United States (U.S.), the resulting financial exposure faced by regional
9 electric utilities, the experience of those utilities in managing that financial exposure,
10 and related implications for PacifiCorp's proposed remedies.

11 **Q. Please summarize the principal conclusions of your direct testimony.**

12 A. I find that the structure and evolving terms of PacifiCorp's proposed remedies to
13 growing wildfire exposure are reasonable based on observable threats and the
14 resulting financial exposure, increasing limitations (high cost, limited availability) of
15 traditional risk management tools to address such large exposures, and the precedents
16 established in other jurisdictions, particularly California.

17 More specifically, this conclusion is premised on the following:

18 • PacifiCorp is facing an exogenous, largely climate-induced phenomenon.

19 Growing wildfire risk is similarly afflicting many other electric utilities and
20 society at large.

21 • With wildfire risks mounting, demand for wildfire insurance is expanding at
22 the same time as the supply of insurers willing to bear wildfire risk (and
23 catastrophic climate-event risk generally) is contracting. Unsurprisingly, the

1 current supply/demand imbalance is resulting in much higher costs per dollar
2 of coverage. Company witness Mariya V. Coleman discusses the challenges
3 of procuring excess liability insurance for the 2024-2025 policy year.

- 4 • Electric utilities in PacifiCorp’s region have both (i) faced dramatic increases
5 in the levels and unpredictability of wildfire insurance costs, and (ii) crafted
6 workable solutions for those costs in recent rate-case proceedings. These
7 solutions appropriately recognize wildfire insurance as a legitimate cost of
8 service and form useful precedents for PacifiCorp’s recovery of such costs.
- 9 • As a separate matter, to the degree commercial insurance markets become
10 dysfunctional—e.g., if insurance premia offered to PacifiCorp rise to levels in
11 excess of statistically expected losses, or if the availability of such insurance
12 should simply dry up to where it is not possible to obtain any incremental
13 coverage—it may make sense to replace commercial insurance with self-
14 insurance (which formed the basis for recent settlements in California).
15 PacifiCorp is thus proposing contingent authorization to substitute self-
16 insurance for commercial insurance.
- 17 • Importantly, even if PacifiCorp is able to recover increased costs for
18 customary amounts of wildfire liability insurance, it still faces potential rare
19 but catastrophic exposure to unprecedented levels of extreme wildfire loss
20 claims that I understand may be uninsurable at any cost in commercial
21 markets. Such worst-case events could be crippling to PacifiCorp’s financial
22 stability and potentially disruptive to normal utility operations. PacifiCorp is

1 therefore additionally proposing a new Catastrophic Fire Fund—above and
2 beyond customary coverage—to absorb such extreme losses.

- 3 • Subject to compliance with reasonable mitigation standards, extreme wildfire
4 loss claims (if they occur) should be viewed as costs of utility service
5 recoverable from customers (just as insurance premia normally are). This is
6 because such losses are a residual risk made inevitable under rational utility
7 management. It is unrealistic to expect that PacifiCorp (or any other utility)
8 could avoid extreme wildfire losses through physical mitigation alone, which
9 is limited by the extreme difficulties of anticipating extreme weather, vast
10 geography, finite capital resources, and diminishing marginal returns to
11 wildfire mitigation investment. Put another way, mitigation can reduce the
12 likelihood of fire events, but external circumstances largely determine the
13 damage from them.

- 14 • Customers and regulators themselves will also recognize these factors in
15 resisting large upfront costs for wildfire mitigation. Thus, some form of
16 agreed, socialized cost recovery for these adverse possible situations should
17 be developed before they arise.

18 Importantly at this time, PacifiCorp is continuing to assess the magnitude of
19 wildfire liability risk expected to affect its service territories and expects to complete
20 an assessment in in March 2024.

1 **III. REGIONAL WILDFIRE RISK AND COST ARE GROWING**

2 **Q. Please describe the landscape of wildfire occurrence in the West and beyond in**
3 **recent years.**

4 A. Wildfire risk is a growing and menacing global phenomenon, which has had a
5 material adverse impact on diverse businesses and individuals far beyond Oregon in
6 recent years and months. Major wildfire risk zones have been identified in
7 geographies as diverse as Europe, Australia, Canada, South America, and the Western
8 U.S.¹ In North America, wildfire risk has become a chronic issue, i.e. more frequent,
9 larger, and more consequential (similar to other climate-driven natural disasters in the
10 rest of the U.S. and around the world). For example, recent analysis of human-caused
11 wildfires in the west by the National Interagency Fire Center shows an approximately
12 five-fold increase in acres burned annually from 2001 to 2022 (see also Exhibit
13 PAC/502).² The bulk of this occurred in the western states—mostly in California but
14 recently including the Pacific Northwest. Recent wildfires have had devastating
15 consequences for electric utilities in California and Hawaii, as well as Colorado,
16 Idaho, Oregon, Washington, and Texas.³

17 **Q. How has this increase been correlated with the growth in other extreme weather**
18 **events?**

19 A. The increasing frequency and severity of wildfires has occurred in parallel with
20 climate change generally, as well as other climate-related natural disasters such as

¹ <https://www.marshmcclennan.com/insights/publications/2019/oct/wildfire-paper--oct--2019-.html>. See also, *Wildfires on Chile's Coast Kill 112 and Leave Hundreds Missing*, New York Times, Feb. 4, 2024.

² National Interagency Fire Center, “Wildfires and Acres”, Oct. 1, 2023, <https://www.nifc.gov/fire-information/statistics/human-caused>. The west includes the Northwest, California, Northern Rockies, Great Basin, and Southwest regions.

³ S&P Global Ratings, *A Storm is Brewing: Extreme Weather Events Pressure North American Utilities' Credit Quality* (Nov. 9, 2023).

1 floods, hurricanes, and severe cold-weather storms. It is intuitive that wildfire risk can
2 be both widespread and increasingly severe and damaging, since it is largely a
3 function of the effects of climate change interacting with residential and commercial
4 growth in locations already prone to ignition (the so-called wildland-urban interface,
5 or WUI). Conditions such as high temperatures and low precipitation have been
6 linked to extended fire seasons, exacerbating weather conditions such as high winds,
7 and near inability to predict the behavior of individual fires.⁴

8 **Q. What about the cost impact of wildfires?**

9 A. The cost impact of wildfires has grown with the physical impact. Globally, the pace
10 of reported economic losses from wildfires have more than doubled since 2015
11 relative to the prior 15 years.⁵ This step-change is even more pronounced for the U.S.,
12 where, comparing the same time period, economic losses have increased five-fold,
13 and in some years amounted to many tens of billions of dollars (see Exhibit
14 PAC/503).⁶

15 **Q. How have affected utilities insured against this risk?**

16 A. Utilities have customarily obtained commercial insurance to cover multiple liabilities
17 including wildfires on a bundled basis. In limited instances, utilities have augmented
18 commercial insurance with capital market instruments to cover highly specified risks
19 such as wildfires in the form of so-called “Catastrophe Bonds”. More recently, as

⁴ Next-Generation Fire and Vegetation Modeling for a Hot and Dry Future, Federation of American Scientists, June 20, 2023.

⁵ Aon, 2023 Weather, Climate and Catastrophe Insight.

⁶ National Oceanic and Atmospheric Administration – National Centers for Environmental Information U.S. Billion-Dollar Weather and Climate Disasters (2023), <https://www.ncei.noaa.gov/access/billions/state-summary/US>.

1 further described below, utilities in California have turned to self-insurance
2 specifically for wildfires.

3 **Q. How has the growth in extreme events affected the availability of commercial**
4 **insurance?**

5 A. Risks stemming from climate change and wildfires have contributed to a tightening of
6 coverage availability provided by the commercial insurance industry. The industry
7 has noted that “many risk buyers [seeking insurance coverage] are challenged to find
8 adequate coverage for their natural catastrophe-prone exposures.”⁷ In response to
9 significant and severe losses and “limitations” in effectively modeling future
10 catastrophes, many insurance providers have chosen to “de-risk or withdraw” from
11 offering certain coverages.⁸ The problem appears to be anxiety over the rising
12 frequency and costs of fire events and the correlated problems with other climate
13 related risks.⁹

14 **Q. Have these climate change and wildfire risks affected the availability of**
15 **commercial insurance for electric utilities, including for PacifiCorp?**

16 A. Yes. PacifiCorp has encountered recent difficulty in obtaining wildfire liability
17 insurance. As explained by Company witness Coleman, insurers who historically

⁷ Aon, *Climate and Catastrophe Insight*, at 29 (2024).

⁸ Howden, *The Great Realignment* at 14 (2023), accessed at <https://www.howdengroup.com/sites/g/files/mwfley566/files/2023-01/the-great-realignment-report-2023.pdf>. See also, p. 11: “Persistent and elevated catastrophe losses, along with the attendant issue of catastrophe model efficacy, continued to drive sentiment in property lines amidst concerns that changing weather patterns are increasing both the frequency and severity of climate-sensitive perils. Higher retentions, tighter terms and reduced frequency coverage (i.e. aggregates, lower excess-of-loss layers, quota shares) reflected reinsurers’ resolve to focus more on capital protection after six consecutive years of above-average catastrophe losses.”

⁹ See, Claire Wilkinson, *Utilities contractors challenged in finding wildfire coverage*, Business Insurance, accessed at <https://www.businessinsurance.com/article/20210525/NEWS06/912342050/Utilities-contractors-challenged-in-finding-wildfire-coverage>: “The lack of interest from the marketplace to cover wildfire risks, in general, has ‘spread like a wildfire’ beyond California and throughout the country...”

1 would consider selling wildfire liability will no longer do so.

2 This experience is hardly unique to PacifiCorp or other Berkshire Hathaway
3 Energy entities. In the course of its 2023 general rate case (GRC) process, PG&E
4 reported that “there has been a significant decrease in the number of insurers offering
5 wildfire coverage to California [investor owned utilities (IOUs)].”¹⁰ This situation has
6 led to PG&E receiving anemic insurance company responses to recent wildfire
7 insurance solicitations, reporting only 16 offers to 73 inquiries in 2021.¹¹ The trend
8 was observed as early as 2017, when SCE was already noting a “diminishing general
9 liability and wildfire insurance market in California for investor-owned utilities, to
10 the extent even available.”¹²

11 **Q. How has increased wildfire risk affected the cost of commercial insurance?**

12 A. Increased wildfire risk has led to sharp increases in the cost of wildfire liability
13 insurance for utilities. Company witnesses Coleman and Steward address the cost
14 increases experienced by PacifiCorp. This reflects both the increasing burden on the
15 insurance industry from rising claims and the much more difficult risk estimation that
16 has accompanied the global warming aspects of the problem. For instance, the current
17 wildfire operational models are deemed “incapable” of simulating and accounting for
18 the “substantial ecosystem changes that are occurring from climate change.”¹³

¹⁰ *Application of Pacific Gas and Electric Company for Authority, Among Other Things, to Increase Rates and Charges for Electric and Gas Service on January 1, 2023*, Application (A.) 21-06-021, Exhibit 9, Chapter 3 at 3-23.

¹¹ *Id.*, p. 3-26.

¹² Letter from Russell G. Worden to Timothy J. Sullivan, “Letter of notification establishing a Z-Factor for costs associated with incremental wildfire-related liability insurance,” at 2–3 (Dec. 29, 2017).

¹³ Matthew Hurteau, *Next-Generation Fire and Vegetation Modeling for a Hot and Dry Future*, Federation of American Scientists (June 20, 2023), accessed at <https://fas.org/publication/next-generation-fire-and-vegetation-modeling-for-a-hot-and-dry-future/>.

1 While frequently not made public, wildfire insurance costs and coverage
2 levels have been made available in financial and regulatory filings by the California
3 IOUs. More limited insurance data has been provided by other utilities in the west,
4 such as Avista Corporation and Idaho Power Company (Idaho Power) in the course of
5 regulatory filings. Insurance cost data is summarized in Exhibit PAC/504¹⁴ and
6 placed in context relative to insurance coverage levels (where available) and
7 operating and maintenance (O&M) expense.¹⁵

8 • *PG&E*—PG&E has experienced the sharpest cost increases, with wildfire
9 liability insurance costs growing by approximately a factor of ten since 2017
10 in both absolute terms and costs per dollar of coverage.¹⁶ For the period 2022-
11 2023, PG&E’s wildfire liability insurance expense stood at \$745 million, for
12 coverage of \$940 million.¹⁷ Thus, for that period, PG&E was paying an
13 effective wildfire liability insurance premium of 79 percent. PG&E’s wildfire
14 liability insurance expense for 2022-2023 comprised approximately 8 percent
15 of total O&M expense for calendar 2022, versus approximately 1 percent in
16 2017.

17 PG&E noted in its 2023 GRC application that “the difficulty of
18 managing the company’s risks through the commercial insurance market
19 alone continues to be extremely challenging as does the prospect of accurately
20 forecasting the costs to do so.”¹⁸ Among other things, the new market

¹⁴ Note that regulatory orders approving the recovery of self-insurance costs are summarized below in Section V(A).

¹⁵ Specifically, O&M costs omitting fuel and purchased power.

¹⁶ A. 21-06-021, CPUC Decision (D.) 23-01-005 at Table 2 (Jan. 17, 2023) (the “PG&E Decision”).

¹⁷ *Id.*

¹⁸ A.21-06-021, Application, Exhibit 9, Chapter 3 at 3-24.

1 conditions mean that “PG&E now procures most of its wildfire coverage
2 separately from coverage for other perils, essentially creating two different
3 insurance towers—one for wildfire and one for non-wildfire.”¹⁹

- 4 • *SCE*—SCE has experienced similar, if less extreme, increases in wildfire
5 insurance costs, with costs per dollar of coverage doubling since 2018, to
6 43 percent for the 2022-2023 period.²⁰ SCE’s wildfire liability insurance
7 expense stepped up from 9 percent of O&M in 2018 to nearly 13 percent on
8 average for 2019-2021.

9 In SCE’s 2021 GRC request, SCE recognized that its wildfire liability
10 insurance expense forecast of \$624 million was “significantly higher than
11 previous years, but that is not unexpected given the dramatically increased
12 risks faced by electric utilities from wildfires, and the insurance industry’s
13 willingness to insure against those risks.”²¹ SCE observed further that these
14 wildfire insurance market conditions were “well known to and [had] been
15 frequently and explicitly recognized by the Commission.”²² SCE additionally
16 noted that “in the current insurance environment, it is impossible to forecast
17 wildfire liability insurance premiums precisely.”²³

- 18 • *SDG&E*—Similarly, SDG&E’s wildfire liability insurance costs nearly tripled
19 in absolute terms from the 2016-2017 period to 2022-2023, when they stood

¹⁹ *Id.*, at 3-23.

²⁰ Edison International Form 10-K.

²¹ *Application of Southern California Edison Company for Authority to Increase its Authorized Revenues for Electric Service in 2021, Among Other Things, and to Reflect that Increase in Rates*, A.19-08-013, Opening Brief of Southern California Edison Company at 238 (Sept. 11, 2020).

²² *Id.*

²³ *Id.*, at 247.

1 at \$221 million.²⁴ Assuming that SDG&E has maintained coverage levels of
2 approximately \$1.5 billion (as reported in SDG&E’s 2020 cost of capital
3 proceeding²⁵), this represents an effective wildfire insurance premium of
4 15 percent for 2022-2023. As a percentage of O&M costs, SDG&E’s wildfire
5 liability insurance costs grew from approximately 8 percent in 2016 to
6 14 percent on average for 2019-2022.

7 In its 2024 GRC application, SDG&E noted that “[i]nsurance market
8 uncertainty continues because of wildfire risk, inverse condemnation, and
9 global catastrophe losses. Because of this uncertainty and continued volatility
10 in the cost of liability insurance, SoCalGas and SDG&E request that the
11 Commission reauthorize their [balancing accounts] for liability insurance
12 premiums.”²⁶

- 13 • *Avista*—Avista reported a doubling in general liability insurance expense
14 between 2020 and 2022, when costs reached \$14 million.²⁷ This represented a
15 near doubling in insurance expense as a percentage of O&M—from
16 1.8 percent to 3.3 percent—over the same period.

²⁴ *Application of San Diego Gas & Electric Company for Authority, Among Other Things, to Update its Electric and Gas Revenue Requirement and Base Rates Effective on January 1, 2024*, A.22-05-016, SDG&E Prepared Direct Testimony of Dennis J. Gaughan (Corporate Center - Insurance), Table DG-18 (years 2021 and 2022 are forecasts) (May 2022).

²⁵ *Application of San Diego Gas & Electric Company*, A.19-04-017, Exhibit No. SDG&E-05, Prepared Direct Testimony of John J. Reed and James M. Coyne at 34 (Apr. 2019).

²⁶ A.22-05-016, SDG&E Prepared Direct Testimony of Dennis J. Gaughan (Corporate Center - Insurance) at DJG-24 (May 2022).

²⁷ *Avista Corporation v. WUTC*, Washington Utilities and Transportation Commission (WUTC), Docket Nos. UE-220053, UG-220054, UE-210854, Rebuttal Testimony of Elizabeth M. Andrews, Table 7 (August 19, 2022).

1 Avista identified these cost increases as “largely related to wildfire
2 exposure in the industry at large, and especially in the West.”²⁸ Avista further
3 characterized the costs as “undoubtedly ‘extraordinary’ and volatile” relative
4 to past years, and “beyond the Company’s control, notwithstanding our best
5 efforts under the Wildfire Resiliency Plan.”²⁹

- 6 • *Idaho Power*—Idaho Power reported a 64 percent increase in Excess Liability
7 insurance expense between 2020 and 2022, when costs exceeded
8 \$14 million.³⁰ This represented a 46 percent increase in insurance expense as
9 a percentage of O&M expense—from 2.3 percent to 3.3 percent—over the
10 same period.

11 Idaho Power has attributed these costs “to the frequency and
12 magnitude of Western-state wildfires in recent years, as well as Idaho Power’s
13 specific wildfire risk.”³¹ Like other utilities, Idaho Power is a “price taker”
14 when it comes to buying insurance. The Company notes that “[i]n that regard,
15 despite annual assessment of its insurance portfolio to identify the best value
16 and the retention of an experienced insurance broker, the Company is subject

²⁸ *Avista Corporation v. WUTC*, WUTC Docket Nos. UE-220053, UG-220054, UE-210854, Direct Testimony of Elizabeth M. Andrews, p. 70 (January 25, 2022).

²⁹ *Id.*, p. 68.

³⁰ *In the Matter of the Application of Idaho Power for an Accounting Order Authorizing the Deferral of Incremental Wildfire Mitigation and Insurance Costs*, Idaho Public Utilities Commission Case No. IPC-E-21-02, filed Jan. 22, 2021; *In the Matter of the Application of Idaho Power for Authority to Increase its Rates and Charges for Electric Service in the State of Idaho and for Associated Regulatory Account Treatment*, Idaho Public Utilities Commission (IPUC) Case No. IPC-E-23-11, Motion for Approval of Stipulation and Settlement, October 2023.

³¹ *Application of Idaho Power for an Accounting Order Authorizing the Deferral of Incremental Wildfire Mitigation and Insurance Costs Before the Idaho Public Utilities Commission*, IPUC Case No. IPC-E-21-02, Application at 26 (Jan. 2021).

1 to price increases as insurers raise premiums due to losses, either pertaining to
2 Idaho Power or to insurers' overall insured base.”³²

3 **Q. How have increased wildfire risks otherwise affected electric utilities?**

4 A. Perhaps inevitably, the interactions of wildfires and utility equipment have led to
5 claims and court rulings against utilities. This has been exacerbated in California by
6 the doctrine of “inverse condemnation”—under which I understand utilities
7 automatically bear responsibility for wildfire damage claims involving their
8 equipment or operations as a legal matter. Wildfire liability claims have been upheld
9 against utilities in other states not necessarily subject to inverse condemnation as
10 well.

11 Wildfire claims have aggregated in the tens of billions of dollars for the
12 California IOUs (PG&E, SCE, and SDG&E), and, more recently, as much as
13 \$2.4 billion in probable losses accrued by PacifiCorp as of September 30, 2023.³³

14 **Q. Have there been adverse reactions from the credit rating agencies?**

15 A. Yes. Credit rating agencies have been concerned with the risks of wildfires on utility
16 credit profiles. As specifically discussed by Company witness Steward, the risk of
17 wildfire liabilities was a cause for Standard & Poor's (S&P) and Moody's Investor
18 Service (Moody's) to downgrade PacifiCorp's senior unsecured issuer rating during
19 2023. S&P downgraded PacifiCorp to BBB+ in June 2023, stating their belief that
20 “the operating risks for PacifiCorp have significantly increased.”³⁴ Moody's

³² Idaho Public Utilities Commission, Case No. IPC-E-23-1, Direct Testimony of Brian R. Buckham at 34 (June 2023).

³³ PacifiCorp Form 10-Q for period ending September 30, 2023, at 23.

³⁴ S&P Global, *PacifiCorp Downgraded to 'BBB+', Outlook Revised to Negative; Berkshire Hathaway Energy Co. Outlook Also Negative* (June 20, 2023). S&P assessed PacifiCorp's “stand-alone credit profile” at BB+.

1 downgraded PacifiCorp to Baa1 in November 2023 and stated that “wildfire risk, a
2 form of physical climate risk, was a key driver of the downgrade.”³⁵

3 These risks have affected credit profiles for electric utilities across the
4 industry. As recently noted by S&P, “[d]amages and related costs from physical risks
5 are escalating in North America as regions designated as high-fire risk expand.”³⁶

6 Furthermore, S&P “has downgraded more [Investor Owned Utilities] due to physical
7 events (e.g. hurricanes, storms, and wildfires) over the past six years by nearly
8 10 times compared with the previous 13 years.”³⁷

9 **IV. WILDFIRE MITIGATION CANNOT REASONABLY ELIMINATE ALL**
10 **RISK**

11 **Q. What are utilities currently doing to mitigate wildfire risk?**

12 A. Some utilities in the West are re-evaluating their risk management protocols and cost
13 recovery mechanisms to be more proactive for this kind of problem, including:

- 14 • Compiling better statistics on apparent risk over long periods of time (even if
15 very difficult to do with any precision)—which allows them to at least
16 evaluate what the price of risk is in offered insurance compared to their
17 estimated loss exposure.³⁸
- 18 • Formulating ex ante risk mitigation plans subject to agreement with regulators
19 and intervenors that those plans are aggressive enough (spend enough but not

³⁵ Moody’s Investor Service, *Rating Action: Moody’s downgrades PacifiCorp to Baa1, outlook stable* (Nov. 21, 2023).

³⁶ S&P Global, *A Storm Is Brewing: Extreme Weather Events Pressure North American Utilities’ Credit Quality* (Nov. 9, 2023).

³⁷ *Id.*

³⁸ For example, CA utilities must submit public risk studies as part of the CPUC’s periodic Risk Assessment and Mitigation Phase (“RAM”) proceedings. These studies are probabilistic in nature and address wildfire risk along with a variety of other risks. See <https://www.cpuc.ca.gov/about-cpuc/divisions/safety-policy-division/risk-assessment-and-safety-analytics/risk-assessment-mitigation-phase>.

1 too much money) and are prioritized for most likely effectiveness—with the
2 intent that compliance with these plans will inoculate the utility against
3 findings of imprudence and loss of cost recovery if/when disasters occur
4 despite mitigation efforts.³⁹

5 **Q. Are these plans focused narrowly on wildfires or do they encompass multiple**
6 **risks?**

7 A. It varies. In many cases, insurance covers a suite of possible catastrophic problems of
8 which wildfire is just one. Also for sizing of effort and priority among such risks, it is
9 preferable if a utility’s extreme risk management system is not designed piecemeal,
10 one type of risk at a time (though this is not uncommon, as some hazards tend to
11 occur rarely) but instead reflects some attempt to achieve equal benefits per dollar of
12 effort put into mitigation across all major types of risks (such as cybersecurity, system
13 safety, wildfires, earthquake recovery, extreme storm hardening and recovery). This
14 is difficult because the types of damages across risk types are quite distinct, but to
15 some extent they can be monetized or at least ranked in terms of dimensions like
16 energy delivery disruption likelihood, frequency of occurrence, personnel and
17 customer safety or survival risk, interaction with other critical systems, tendency to
18 include property damage etc., and their mitigations can be ranked in terms of extent
19 of the system and time frame of improved protection achieved by each. This allows
20 an elementary comparison across risks for some degree of equivalent response

³⁹ Note, for example, protocols relating to accessing the California Wildfire Fund described below, which evaluate utility prudence “based on actions taken by a utility, not the outcome of those actions”. See Safety Certification FAQ | Office of Energy Infrastructure Safety, <https://energysafety.ca.gov/what-we-do/electrical-infrastructure-safety/wildfire-mitigation-and-safety/safety-certifications/safety-certification-faqs/>.

1 planning. An integrated approach of this type lends further credibility to the plans for
2 whatever are the strongest concerns.

3 **Q. Why can't these efforts be relied upon to eliminate wildfire risk?**

4 A. Even with the best of utility-sponsored fire mitigation plans, it is impossible (and too
5 expensive even if it were possible in principle) to fully eliminate the wildfire risks in
6 a large region.

7 This is true for several reasons:

- 8 • *Extreme weather poses an unpredictable threat*—Extreme weather amplifies
9 the uncertainty range of consequences and damages of a given wildfire even if
10 the mitigation plans reduce the risk of a wildfire outbreak occurrence. This
11 means that the challenges are a moving target, and factors outside the control
12 of the utility will significantly determine the extent of the outcome of
13 consequences and damages of wildfires. As noted above, it has also made
14 modeling of fire risk quite difficult and inconsistent with recently observed
15 disasters.
- 16 • *Wildfire mitigation comprises a massive geographic challenge*—It is not
17 possible to pinpoint exactly where the wildfires will start in the future, hence
18 one cannot eliminate the wildfire events by preemptive measures at a specific
19 location among many possible locations where a fire could start in a very
20 large area encompassing multiple states. All possible areas need to be
21 targeted, ideally in order of declining risk, which itself is a diagnostic that
22 takes time to develop and implement.

- 1 • *Other responsible entities*—Responsibility to mitigate wildfire risks is
2 typically distributed across multiple agencies and many individuals, with
3 utility mitigation plans forming just one of many relevant factors.
- 4 • *Competing priorities of maintaining service quality*—The expected benefits of
5 additional expenditures on wildfire mitigation plans has to be weighed against
6 customer benefits from spending that money on other programs (reliability,
7 resiliency, service efficiency, customer services, relative risk priority, etc.).
8 Utility expenditures approved by regulators for wildfire mitigation plans
9 typically represent a small portion of total revenue requirements.
- 10 • *Law of diminishing marginal returns to mitigation efforts*—Another
11 consideration that limits the cost effectiveness of additional expenditures to be
12 spent on wildfire mitigation plans by utilities is the economics “law” of
13 diminishing marginal returns. That is the tendency of economic activities to be
14 directed at the most valuable activities first and then to see declining value in
15 subsequent efforts. Since the types of activities in the fire mitigation plans for
16 a given total budget will (or should) be selected based on the greatest possible
17 cost-effective impact in mitigating the wildfire risks, an expansion or
18 continuation of the total budget will start pursuing activities that tend to have
19 smaller and smaller incremental benefits. These declining marginal benefits
20 ultimately justify putting a limit on how much improvement to pursue. In
21 general, all forms of risk reduction become dramatically more expensive as
22 the remaining expected risks decline. This is similar to why electric utilities in
23 the U.S. have typically implemented a 1-in-10 years Loss of Load Expectation

1 threshold (or variations thereof) for determining planning reserve margins to
2 maintain resource adequacy, instead of trying to eliminate all risk for
3 reliability outage events.

4 Thus, residual risk is inevitable under even the most aggressive mitigation
5 plan. And it is likely that associated damage claims will continue to occur. But
6 wildfire mitigation plan effectiveness will gradually reduce the amount and cost of
7 insurance otherwise needed.

8 **Q. How should appropriate mitigation be determined?**

9 A. In a regulatory setting, while the utility has the greatest expertise and best vantage
10 point for assessing costs and benefits of any particular mitigation program, the
11 process of determining appropriate mitigation efforts and protocols is as much
12 negotiation as analysis, involving all stakeholders. Again, given the infeasibility of
13 eliminating the risk, there must be a balance of interest among stakeholders about
14 how far and fast to go, relative to using funds and resources for other important utility
15 services. Similarly, the right amount and layering of insurance (commercial or self-
16 provided) also needs this joint resolution, as insurance does not eliminate risk, it
17 simply spreads out how the expected risk is paid for, and improves liquidity if/when
18 the risk occurs. There is no per se right level of such smoothing, as this interacts (like
19 mitigation) with other budgetary tradeoffs for the utility and its customers. The
20 stakeholder workshops that PacifiCorp has been implementing are a good venue for
21 such discussions.

1 **V. POTENTIAL REGULATORY RELIEF**

2 **Q. Is a utility's wildfire risks and costs already compensated by its allowed return**
3 **on equity (ROE) making regulatory mechanisms unnecessary?**

4 A. No, wildfire risks and costs are not typically compensated by a utility's allowed ROE,
5 nor would such compensation be very effective in the event it was allowed. This is
6 recognized by regulators in the normal practice of providing for recovery of insurance
7 costs above and beyond allowed ROEs, and applies all the more to increased
8 insurance premia and/ or costs associated with extreme wildfire events. Exogenous
9 risks like wildfire liability are not well captured in utility ROEs because of two types
10 of asymmetry: 1) the one-sided nature of insurance risks generally and 2) the lack of
11 any offsetting upside available to regulated utilities under cost of service rate making
12 and cost of equity benchmarks that exclude idiosyncratic risks (such as wildfires
13 affecting a particular utility).

14 Insurance costs are intuitively one-sided. The possible losses from insurance
15 risks reduce the expected cash flows from an asset, but that reduction is not
16 accompanied by any prospect of compensatory upside returns.

17 **Q. Please elaborate with some examples.**

18 A. For example, when a public company faces an economic loss from a third-party
19 liability claim, its stock price will fall, all else equal. That stock will not be expected
20 thereafter to appreciate more than similar companies that do not have that problem,
21 and so shareholders will not have the opportunity to cover the unexpected loss.⁴⁰

⁴⁰ Importantly, insurance losses can be diversified but they cannot be diversified *away*, which is unlike other business risk that involves a blend of uncorrelated economic outcomes, some positive and some negative.

1 The asymmetry problem is more severe for regulated utilities than for
2 unregulated companies, which have at least the opportunity to choose when, where,
3 how, and how much to invest, and therefore some chance of earning returns in excess
4 of their cost of capital. Regulated utilities, by contrast, do not have this discretion, as
5 they operate under an obligation to serve with cost-of-service pricing and very limited
6 or no upside opportunities relative to allowed ROEs.

7 **Q. What about allowing a premium ROE to cover asymmetric risk?**

8 A. An allowed ROE could be augmented, in principle, by a premium to the customarily
9 measured cost of capital to reflect asymmetric risk. However, there are multiple
10 challenges to applying this ROE approach, not least that there are considerable
11 estimation difficulties of the appropriate amount (given the recent growth in
12 frequency and severity of wildfires) which make it possible that even a large premium
13 only partly addresses the problem. At the same time, an allowance may create the
14 incorrect impression in the eyes of the public and regulators that the utilities have
15 been fully compensated for damage costs from all potential wildfire catastrophes.

16 Absent a meaningful opportunity to offset risk via returns on investment, it is
17 essential that utilities have a variety of equitable cost recovery mechanisms such as
18 recovering higher commercial insurance costs (possibly through self-insurance) and
19 those discussed below.

1 A. **Recovering Higher Commercial Insurance Costs**

2 Q. **How have increased wildfire liability insurance costs been handled by other**
3 **utilities and their regulators?**

4 A. The large increases in wildfire insurance costs described above have presented urgent
5 challenges in cost recovery for affected utilities and their regulators. In particular, the
6 cost recovery settlements achieved by the California IOUs (“California Precedents”),
7 Avista and Idaho Power (together, the “Regional Precedents”) provide useful context
8 for PacifiCorp’s filing. The Regional Precedents directly inform PacifiCorp’s filing in
9 the following ways:

- 10 • Regulatory acknowledgement of higher and more uncertain wildfire insurance
11 costs,
- 12 • Regulatory recognition of exogenous drivers, and
- 13 • Self-insurance mechanisms similar to those currently being considered by
14 PacifiCorp.

15 Importantly, the California Precedents further underscore the recognition of
16 current uncertainty in wildfire liability insurance markets by authorizing the recovery
17 of wildfire insurance costs on a contingent (i.e. formulaic) basis, as discussed further
18 below.

19 Q. **Please describe the California Precedents.**

20 A. Given that the costs of commercial wildfire insurance have reached such high levels,
21 the California IOUs have each recently been authorized or have settlements pending
22 that would authorize recovery of very substantial wildfire self-insurance costs over
23 multi-year periods.

1 The California Settlements are summarized below and in Exhibit PAC/505.

2 • *PG&E*—In CPUC Decision 23-01-005, issued in January 2023⁴¹, PG&E was
3 authorized to self-insure by setting aside funds potentially approaching recent
4 commercial cost levels toward covering wildfire liability up to \$1 billion
5 annually for the “2023 GRC Period”: 2023–2026.

6 In a “worst case” scenario assuming wildfire liability claims of
7 \$1 billion in each year of the 2023 GRC Period, the PG&E Settlement
8 provided that 72 percent of realized costs would be recovered via PG&E’s
9 Risk Transfer Balancing Account (RTBA)⁴² not subject to reimbursement
10 “tied to the outcomes of reasonableness reviews.”⁴³ In such a “worst case”
11 scenario, most of the 28 percent portion remaining uncollected at the end of
12 the 2023 GRC Period could be subsequently recovered from customers via a
13 Tier 2 Advice Letter Filing,⁴⁴ with 5 percent paid by a shareholder
14 deductible.⁴⁵

15 Importantly, per the agreed Settlement formulas illustrated in
16 Appendix B of the PG&E Settlement, the portion of claims recoverable not

⁴¹ See CPUC A.21-06-021, PG&E Decision (approving settlement between PG&E, the Utility Reform Network, and the Public Advocates Office at the CPUC (PGE Settlement)).

⁴² The RTBA had been previously established in CPUC D.20-12-005 (Dec. 3, 2020) to “record the difference between the amounts authorized in this GRC and actual costs of insurance premiums for coverage up to \$1.4 billion” (D.20-12-005 at 249). D.20-12-005 further noted that “[r]egarding the establishment of the RTBA, we agree that insurance costs for General Liability coverage has been difficult to predict in recent times because of market conditions and the recent wildfires in California. A two-way balancing account will also allow PG&E to address uncertainty in a timely manner and at the same time ensure that there is adequate insurance coverage” (D.20-12-005 at 254).

⁴³ See PG&E Decision, at 13, and PG&E Settlement Section 3.4 and Appendix B: “Illustrative Calculation Reflecting the Worst Case Scenario—Cost Recovery for Undercollections at the End of the 2023 GRC Period”, the latter reflected in Exhibit 5.

⁴⁴ PG&E Settlement Section 3.7 and Appendix B. Note that a Tier 2 Advice Letter could be subject to challenge.

⁴⁵ PG&E Settlement Section 3.2.3.

1 subject to a reasonableness review could be increased significantly under a
2 less adverse loss scenario. For example, were realized losses over the 2023
3 GRC Period limited to the level actually experienced for 2019-2021
4 (\$458 million per year), such recoveries would grow to 93 percent.⁴⁶

5 In support of the PG&E Settlement, the PG&E Decision
6 acknowledged the insurance market realities affecting PG&E:

7 “Due to a number of factors including PG&E’s increased claims, the
8 general liability insurance market continued to increase insurance
9 premiums and reduce the availability of insurance to cover wildfire risk.
10 As Table 2 illustrates, PG&E’s wildfire liability insurance cost per limit
11 of coverage grew until the costs reached 81.6 percent of the coverage
12 amount for the 2020-21 insurance policy.”⁴⁷

13 As to self-insurance, the CPUC reasoned that “[s]ince 2017, wildfire
14 liability insurance for third-party claims has risen to the point that self-
15 insurance is likely to achieve sufficient insurance coverage at a lower overall
16 cost to PG&E’s customers than commercial insurance.”⁴⁸ The PG&E
17 Decision went on to say that “[n]ow that the cost of commercial insurance is
18 up to 80 percent of the coverage it would provide, the Commission finds the
19 Settlement recommending PG&E to use self-insurance for wildfire claims to
20 be a reasonable alternative.”⁴⁹

- 21 • *SCE*—Similar to PG&E, in CPUC D.23-05-013,⁵⁰ SCE was authorized to
22 self-insure toward covering wildfire liability up to \$1 billion annually for the

⁴⁶ See Exhibit PAC/505.

⁴⁷ PG&E Decision, at 6. The PG&E Decision additionally recognized that “[g]iven the significant difference in price for wildfire and non-wildfire liability insurance, PG&E now purchases liability coverage for wildfire claims separate from non-wildfire liability insurance” (PG&E Decision at page 4).

⁴⁸ PG&E Decision, at 2.

⁴⁹ *Id.*, at 15.

⁵⁰ See A.19-08-013, D.23-05-013 (May 19, 2023) (the SCE Decision), approving the Settlement between SCE, The Utility Reform Network, and the Public Advocates Office at the CPUC (the SCE Settlement).

1 “Program Period”: July 2023–December 2028,⁵¹ again by setting aside funds
2 potentially approaching recent levels of commercial wildfire insurance costs.

3 In a “worst case” scenario assuming wildfire liability claims of
4 \$1 billion in each year of the Program Period, 74 percent of realized costs
5 would be recovered via SCE’s Risk Management Balancing Account
6 (RMBA)⁵² not subject to reimbursement tied to the outcomes of
7 “reasonableness reviews”.⁵³ In such a “worst case” scenario, most of the
8 26 percent portion remaining uncollected the end of the 2023 GRC Period
9 could be recovered via a Tier 2 Advice Letter Filing⁵⁴, with 1.25 percent paid
10 by a shareholder deductible (2.5 percent on amounts above the \$500 million
11 of annual claims). Importantly, per the agreed Settlement formulas, the
12 portion of claims recoverable via the RMBA could be increased significantly
13 under a less adverse scenario. For example, were realized losses over the
14 Program Period limited to \$400 million per year—per Appendix B, Example 2
15 of the SCE Settlement—claims recoverable via the RMBA would grow to
16 85 percent.

17 In support of the settlement, the CPUC noted the following:

18 “SCE’s wildfire insurance costs have increased significantly in recent
19 years. In the 2018 GRC, the Commission authorized \$92.4 million for
20 total liability insurance expense (combined wildfire and non-wildfire)
21 for the 2018 test year. In the Track 1 decision, the Commission
22 authorized a 2021 test year forecast of \$460.0 million for wildfire
23 liability insurance costs to obtain \$1 billion of coverage based on SCE’s

⁵¹ Note that 2025 – 2028 would remain subject to revision in the 2025 GRC; *see* SCE Decision page 6.

⁵² As further described below, the RMBA was established as part of SCE’s 2021 GRC.

⁵³ SCE Decision, page 8; and SCE Settlement Section 3.4 and Appendix B: “Illustrative Calculation Reflecting the Worst Case Scenario—Cost Recovery for Undercollections at the End of the Program Period”.

⁵⁴ *See* SCE Settlement Sections 3.3.2, 3.7 and Appendix B. Note that a Tier 2 Advice Letter could be subject to challenge.

1 recorded 2020 costs. Due to the volatility and uncertainty of these costs,
2 the Commission authorized SCE to establish the one way RMBA to
3 ensure any overcollection is returned to ratepayers and also authorized
4 SCE to continue to seek rate recovery of any costs in excess of the
5 forecast through its WEMA.”⁵⁵

6 The CPUC articulated further the same reasoning it had used in the

7 PG&E Decisions:

8 “Although not guaranteed, we find it likely that customers will receive
9 more cost savings and benefits from self-insurance in 2023 and 2024
10 compared to commercial insurance. The proposed self-insurance
11 program for SCE is substantially similar to the multi-year 100 percent
12 self-insurance program for wildfire liability approved for Pacific Gas
13 and Electric Company (PG&E) in its 2023 GRC.”⁵⁶

- 14 • *SDG&E*—In a joint motion filed in October 2023, SDG&E and key
15 stakeholders proposed a settlement embedding a wildfire liability self-
16 insurance option within an authorized test year forecast of \$173 million for up
17 to \$1 billion in commercial wildfire liability coverage.⁵⁷ The self-insurance
18 option would allow SDG&E (with SoCalGas) to set aside \$14 million per year
19 toward the first \$50 million of potential losses.⁵⁸ The SDG&E Settlement
20 remains under consideration by the CPUC.

⁵⁵ SCE Decision, at 9-10. WEMA refers to the Wildfire Expense Memorandum Accounts under which California utilities can record wildfire-related costs pending authority to reflect those costs in rates. See also *Decision Approving Southern California Edison Company’s Application for Authorization to Recovery Costs Related to Wildfire Insurance Premiums Recorded in its Wildfire Expense Memorandum Account*, D. 20-09-024 (September 24, 2020).

⁵⁶ SCE Decision, at 13.

⁵⁷ See CPUC A. 22-05-016, Joint Motion of Southern California Gas Company (U 904 G), SDG&E, The Public Advocates Office at the CPUC, The Utility Reform Network, The Utility Consumer’s Action Network, and Community Legal Services for Adoption of a Settlement Agreement Resolving All Insurance Issues, filed Oct. 24, 2023, (the SDG&E Settlement).

⁵⁸ SDG&E Settlement, at 11.

1 **Q. Please describe the other Regional Precedents.**

2 A. Other noteworthy precedents include wildfire insurance settlements recently achieved
3 by Avista Corporation and Idaho Power.

- 4 • *Avista*: In Final Order 10/04,⁵⁹ the WUTC approved a settlement authorizing
5 Avista to establish an Insurance Expense Balancing Account for 2023 and
6 2024 with a step-up in baseline authority of approximately \$5.3 million.

7 The WUTC noted the following:

8 “[W]e find that Avista has demonstrated unprecedented increases and
9 volatility in its insurance costs. We agree that Avista has shown the
10 insurance expense increases in recent years are “extraordinary” and
11 “volatile” and caused an under-recovery of approximately \$5.3 million
12 in 2022. We also find that Avista has demonstrated that it has taken and
13 is taking appropriate steps to try to control these costs, but has shown
14 unprecedented recent increases in insurance that are largely out of its
15 control.”⁶⁰

- 16 • *Idaho Power*—The IPUC has allowed Idaho Power to defer incremental costs
17 associated with its insurance premiums. The IPUC approved this deferred
18 treatment in 2021, stating the following:

19 “We agree with the Company that customers should benefit from
20 adequate insurance coverage. Insurance protects the Company and its
21 customers from unforeseen wildfire-related costs which have caused
22 utility bankruptcy in recent years. While the increased insurance
23 premiums, including the “wildfire load,” represent additional costs, the
24 alternative is not prudent or wise. We believe the Company’s proactive
25 investment will provide benefits to customers should the Company ever
26 face significant wildfire liability. We find it reasonable to allow the
27 Company to defer its Idaho jurisdictional share of incremental wildfire
28 insurance costs above 2019 levels.”⁶¹

⁵⁹ WUTC Docket Nos. UE-220053, UG-220054, UE-210854 (cons.), Final Order 10/04 (Dec. 12, 2022).

⁶⁰ *Id.*, at 50.

⁶¹ IPUC Case No. IPC-E-21-02, Order No. 35077 at 8 (June 17, 2021).

1 Idaho Power and interveners proposed a settlement in Idaho Power's
2 2023 GRC to continue this deferred treatment. The IPUC approved the
3 settlement.⁶²

4 **Q. What are the implications of these precedents for PacifiCorp's filing?**

5 A. The Regional Precedents have the following implications for PacifiCorp's filing:

- 6 • Perhaps most importantly, they demonstrate strongly that PacifiCorp is not
7 unique in facing the dramatic and pressing challenge of increasing and more
8 volatile wildfire insurance costs.
- 9 • PacifiCorp's utility peers and their regulators recognize wildfire risk—and
10 hence associated insurance costs—as an exogenous risk.
- 11 • Regulatory cost recovery mechanisms need to evolve to deal with the pace
12 and scale of this problem. In this regard, regulators have recently entered into
13 settlements with the California IOUs, Avista, and Idaho Power that both defer
14 increased insurance costs, but, in some cases pre-authorize the contingent
15 commitment of funds for self-insurance (based on claims actually realized).
- 16 • If recent wildfire liability conditions and regulatory treatments can be
17 described as a “new normal,” it is not clear that this state of affairs can be
18 considered stable or predictable. The uncertainty is underscored by the
19 recognition in approved settlements that current conditions are “volatile” and
20 the contingent nature of the California settlements, which are designed to
21 accommodate a wide range of potential wildfire liability outcomes.

⁶² IPUC Case No. IPC-E-23-11, Order No. 36042 at 10 (Dec. 28, 2023).

- 1 • To the degree that PacifiCorp encounters dysfunctional commercial insurance
2 markets similar to what the California IOUs have faced in recent years, there
3 is no reason that PacifiCorp should not similarly avail itself the benefits of
4 self-insurance in some form.

5 **B. Protection From Extreme Events**

6 **Q. What are potential consequences of utility exposure to extreme wildfire claims?**

7 A. As noted above, the “new normal” has included not just uncertainty about increased
8 insurance costs but also the increased likelihood that wildfire liability costs may
9 rarely but very significantly exceed available levels of coverage at any price, possibly
10 reaching several billion dollars. Only a very small number of fires grow to such levels
11 of conflagration, but climate change and more residences and other properties being
12 in the WUI zone of high risk have made the possibility of worst-case scenarios very
13 grim indeed. Claims to date have materially eroded affected utilities’ financial
14 resiliency, and in the case of PG&E, led to bankruptcy in 2019. I understand these
15 huge risks are virtually uninsurable in commercial markets, or at least not at any
16 reasonable price, so they need creative utility-based mechanisms for solutions.

17 **Q. How has the risk of extreme wildfire claims been handled in other jurisdictions?**

18 A. Responding to the urgent threat posed by major wildfires in 2017, 2018, and after, the
19 State of California has established mechanisms to protect utilities from associated
20 financial claims. The goals include maintaining financial stability for utilities in
21 support of their obligation to reliably serve customers.

1 In August 2018, the California state legislature passed a bill to address the
2 cost allocation relating to the 2017 wildfires.⁶³ While I am not an attorney, my
3 understanding is that Senate Bill 901 expanded various fire prevention and mitigation
4 efforts by several state agencies, and it clarified the CPUC’s reasonableness review of
5 utility activities and costs regarding fire mitigation. Importantly, the bill created a
6 framework for socializing wildfire-related costs in 2017 and in future years through a
7 securitized utility financing mechanism. For 2017 specifically, the bill mandated that
8 the CPUC take into account “the electrical corporation’s financial status” by
9 determining “the maximum amount the corporation can pay without harming
10 ratepayers or materially impacting its ability to provide adequate and safe service.”⁶⁴
11 The bill thus established a mechanism for PG&E to recover costs for 2017 wildfires
12 that would otherwise be disallowed, at least beyond the point to where the
13 disallowance would threaten the utility’s financial viability or its ability to provide
14 utility service.⁶⁵

15 Following PG&E’s bankruptcy filing in 2019, the California state legislature
16 passed AB 1054 to further address utility wildfire risk by, among other things,
17 establishing an insurance-like Wildfire Fund (the “California Wildfire Fund”). The
18 legislative language in AB 1054 observed that “[t]he establishment of a wildfire fund
19 supports the credit worthiness of electrical corporations, and provides a mechanism to

⁶³ California Senate Bill 901 (Wildfires), Legislative Counsel’s Digest, published September 8, 2018, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB901.

⁶⁴ Section 27 of Senate Bill 901.

⁶⁵ This concept was further developed by the CPUC in its Order Instituting Rulemaking to Implement Public Utilities Code Section 451.2 Regarding Criteria and Methodology for Wildfire Cost Recovery Pursuant to Senate Bill 901 (2018), July 8, 2019.

1 attract capital for investment in safe, clean, and reliable power for California at a
2 reasonable cost to ratepayers.”⁶⁶

3 The California Wildfire Fund provided \$21 billion of claim-paying coverage
4 to California IOUs in the event of wildfire damages exceeding \$1 billion (assumed to
5 approximate the level of commercial insurance available to each of the California
6 IOUs). Utility shareholders and customers both contributed to the fund in equal
7 measure.

8 It is my understanding that AB 1054 established standards by which the
9 CPUC could determine whether a utility had acted prudently and was therefore
10 eligible to recover wildfire costs through the Fund (or, if the Fund had been
11 exhausted, potentially through electric rates). Prudent conduct in connection with a
12 wildfire event was broadly defined as that consistent with actions that a reasonable
13 utility would have undertaken under similar circumstances, at the relevant point in
14 time, and based on the information available at that time. In due course prudent utility
15 conduct was more specifically codified in the form of specific wildfire mitigation
16 programs and protocols needed to obtain a “safety certification” which formed the
17 main criterion for access to the Fund. Importantly, as part of qualifying for a safety
18 certification, a utility’s implementation of its wildfire mitigation plan “is evaluated
19 based on actions taken by a utility, not the outcome of those actions.”⁶⁷

⁶⁶ AB 1054, Section 1(a)(5).

⁶⁷ See [Safety Certification FAQ | Office of Energy Infrastructure Safety, https://energysafety.ca.gov/what-we-do/electrical-infrastructure-safety/wildfire-mitigation-and-safety/safety-certifications/safety-certification-faqs/](https://energysafety.ca.gov/what-we-do/electrical-infrastructure-safety/wildfire-mitigation-and-safety/safety-certifications/safety-certification-faqs/).

1 **Q. Why should this risk be, at least in part, the responsibility of utility customers?**

2 A. As noted above in Section IV, wildfire mitigation cannot reasonably be expected to
3 eliminate all risks. Additionally, for regulated utilities, the necessary judgment calls
4 relating to system hardening and/or operating protocols do not fall within the sole
5 discretion of management. Mitigation spend and operating protocols must be
6 approved by regulators on behalf of customers. This feature of the regulatory compact
7 amounts, at minimum, to an implicit recognition by regulators that agreed mitigation
8 efforts are optimized from a cost/benefit perspective, and therefore prudent.

9 Meanwhile, negligence standards brought to bear in wildfire damage claims
10 against utilities may not be aligned with the trade-offs necessarily embedded in
11 wildfire mitigation plans. The clearest example of this is the doctrine of “inverse
12 condemnation” applicable in California, which imposes strict liability on the utility
13 without reference to regulatory standards of prudent management. Negligence
14 standards in other jurisdictions may be interpreted to embed inverse condemnation, or
15 for different reasons do not reflect or proxy for feasible wildfire mitigation plans.⁶⁸
16 Neither judges nor juries can be expected to evaluate the technical intricacies of such
17 plans.

18 Instead, it logically falls to utilities, to choose, in conjunction with customers
19 and regulators, a level of mitigation that is balanced and acceptable. The process is
20 one of negotiation as well as analysis. Key trade-offs must be evaluated between
21 factors including fire mitigation, service quality and reliability, rate increases, and

⁶⁸ Notably, the California Wildfire Fund is intended as financial relief from findings of liability, based on prudent utility management. See Safety Certification FAQ | Office of Energy Infrastructure Safety, <https://energysafety.ca.gov/what-we-do/electrical-infrastructure-safety/wildfire-mitigation-and-safety/safety-certifications/safety-certification-faqs/>.

1 potential future exposure. As noted above, the consensus solution is likely to stop
2 short of attempting to solve the whole problem rapidly or even fully.

3 As a natural consequence of these processes, there will be residual risk—
4 elected jointly by the stakeholders. In this circumstance, one in which near-term
5 wildfire mitigation spending and associated rate increases are balanced with
6 competing imperatives, there must be provision for recovering residual exposure
7 should it be incurred.

8 **Q. What is the responsibility of the utility?**

9 A. The *quid pro quo* for such contingent cost recovery, of course, is that utility managers
10 diligently pursue a well-defined wildfire mitigation plan accepted by customers and
11 regulators. This principle was established in forming the California Wildfire Fund,
12 with the following key components:

- 13 • Utility access to the insurance function of the California Wildfire Fund is
14 contingent on maintaining a safety certification giving evidence of compliance
15 with an approved wildfire mitigation plan.
- 16 • Such compliance is to be evaluated based on agreed mitigation efforts—not
17 wildfire outcomes—in recognition of the challenges facing wildfire mitigation
18 and the regulatory process in forming a consensus wildfire mitigation plan.
- 19 • Adherence to mitigation plan should be deemed proof of prudence hence cost
20 recovery. That is, absent negligence, regulators should evaluate utilities on the
21 quality of their inputs to the fire prevention problem, not on the outputs of
22 how many fires happen, how much they cost, or even whether a piece of

1 utility equipment was involved (except insofar as that is a basis for revising
2 future mitigation).

3 **Q. How does PacifiCorp's proposal to address extreme risk meet these criteria?**

4 A. PacifiCorp's proposal to establish a Catastrophic Fire Fund remains in development
5 via the stakeholder workshop process. I understand that the details of the Catastrophic
6 Fire Fund proposal are intended to reflect the principles enumerated above as they
7 take further shape.

8 VI. CONCLUSION

9 **Q. Please summarize your principal conclusions.**

10 A. My principal conclusions can be summarized as follows:

- 11 • PacifiCorp is facing an exogenous, largely climate-induced phenomenon in
12 increased wildfire risk.
- 13 • With wildfire risks mounting, the cost of wildfire liability insurance is
14 increasing dramatically.
- 15 • Similarly positioned utilities have crafted workable solutions for those costs
16 that recognize wildfire insurance as a legitimate cost of service in recent rate-
17 case proceedings.
- 18 • To the degree that PacifiCorp encounters dysfunctional commercial insurance
19 markets similar to what the California IOUs have faced in recent years, there
20 is no reason that PacifiCorp should not similarly avail itself the benefits of
21 self-insurance in some form.
- 22 • To the degree ongoing analysis indicates that PacifiCorp faces material and
23 increasing likelihood of catastrophic exposure to unprecedented levels of

1 extreme wildfire loss claims, PacifiCorp is proposing a new Catastrophic Fire
2 Fund to provide liquidity and maintain longer term financial stability.

3 • Subject to compliance with reasonable mitigation standards, extreme wildfire
4 loss claims (if they occur) should be viewed as costs of utility service
5 recoverable from customers (just as insurance premia normally are).

6 • Thus, some form of agreed, socialized cost recovery for these adverse possible
7 situations should be developed before they arise.

8 **Q. Does this conclude your direct testimony?**

9 **A. Yes.**

Docket No. UE 433
Exhibit PAC/501
Witness: Robert S. Mudge

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

PACIFICORP

**Exhibit Accompanying Direct Testimony of Robert S. Mudge
Statement of Qualifications**

February 2024

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Mr. Robert Mudge is an expert in corporate and project finance matters in the energy industry. He has advised energy clients on issues relating to asset valuation, credit requirements and financial viability in the context of utility regulatory processes and disputes, litigation, international arbitration, and mergers and acquisitions.

Mr. Mudge has provided expert testimony in diverse forums on matters with a bearing on financial feasibility and/or impact, including the Federal Energy Regulatory Commission, public utility commissions in Massachusetts, Missouri, and Alberta, as well as the Massachusetts Superior Court, the Maine Department of Environmental Protection, and the American Arbitration Association. He has testified or submitted expert reports on other matters in Alaska, California, Florida, Illinois, Kentucky, Michigan, North Carolina, the United States Tax Court, and the International Centre for Settlement of Investment Disputes.

In his previous work as an investment banker, Mr. Mudge played a central role in developing financeable contract structures for large public/private infrastructure projects, utility mergers and acquisitions, bankruptcy restructuring, and numerous power project financings. He has also served on the advisory board of a start-up venture focused on the acquisition, development, and operation of renewable fuel generation projects. Mr. Mudge served as Brattle's COO and Treasurer from 2014 to March 2017.

AREAS OF EXPERTISE

- Electric Power
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Mr. Mudge received an M.B.A. in Finance and Economics from the University of Chicago, Graduate School of Business, Chicago, IL, and a B.A. (*cum laude*) from Harvard College, Cambridge Massachusetts.

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Energy Bar Association, Chair - Finance and Transactions Committee, 2016-2017.

EXPERIENCE

- **For the Coalition for Green Capital**, a policy NGO, Mr. Mudge produced a detailed financial model to illustrate the leveraging of private-sector clean energy investment via a proposed National Green Bank (“NGB”, to be capitalized by funding authorized under the Inflation Reduction Act of 2022). The model depicted combining public and private resources to fund a diverse portfolio of debt and equity investments on concessionary terms, as well as grants.
- **For the Shady Hills Energy Center**, a wholly owned indirect subsidiary of General Electric Credit Corporation of Tennessee, Inc., Mr. Mudge submitted testimony before the District Court for the Middle District of Florida addressing custom and practice in project financing. (See also Testimony below).
- **For NTE Energy**, Mr. Mudge submitted testimony before the District Court for the Western District of North Carolina providing a valuation of the Reidsville Energy Center. (See also Testimony below).
- **For CorEnergy Infrastructure Trust, Inc.**, Mr. Mudge sponsored testimony before the California Public Utilities Commission supporting the viability of regulated infrastructure owned by an entity organized as a Real Estate Investment Trust (“REIT”). (See also Testimony below).
- **In connection with a securities fraud case in District Court**, Mr. Mudge assessed the viability and valuation of a portfolio of non-utility power plants in early development in the U.S. and Canada. In particular, Mr. Mudge developed a framework for treating pro forma project cash flow forecasts to account for the development-period risks of completing feasibility analyses, securing sites, obtaining permits, finalizing contracts, and attracting project debt financing. The case settled favorably for client in 2021.
- **For Pacific Gas and Electric Company**, Mr. Mudge led the Brattle team providing analytic support to obtain regulatory approvals in connection PG&E’s emergence from bankruptcy in 2020, with particular focus on PG&E’s path back to investment grade status.
- **For Pacific Gas and Electric Company**, Mr. Mudge sponsored testimony before the Federal Energy Regulatory Commission asserting the continued applicability of prior reports analyzing residual PG&E exposure to financial risk from wildfire claims. (See also Testimony below.)
- **For Siemens Gamesa Renewable Energy (SGRE)**, Mr. Mudge assisted in the preparation of testimony sponsored by a wind energy executive in a dispute between SGRE and one of its suppliers. (See also Testimony below.)

Robert Mudge

- **For Southern California Edison and Pacific Gas and Electric Company**, Mr. Mudge co-sponsored an expert report and supplemental testimony before the California Public Utilities Commission analyzing residual utility exposure to financial risk from wildfire claims in context of recent California legislation. (See also Testimony, below.)
- **For shareholders in Sun Edison**, Mr. Mudge prepared an expert report assessing adequacy of disclosure to shareholders by SunEdison management in 2015. (See also Testimony, below.)
- **For Nicor Gas**, Mr. Mudge prepared a cost of equity analysis. (See also Testimony, below.)
- **For an international engineering, procurement, and construction (EPC) contractor**, Mr. Mudge co-sponsored a confidential expert report estimating the fair market value of a power plant at a future date based on projected cash flows in combination with other assets and foreseeable liabilities. (See also Testimony, below.)
- **For the Government of Grenada in ICSID arbitration**, Mr. Mudge developed a discounted cash flow analysis to value power assets to be repurchased by the government from the Claimants, and demonstrated that the “formula” price originally agreed by the parties was inconsistent with any standard approach to determining fair market value. (See also Testimony, below.)
- **For Goldman Sachs**, Mr. Mudge assessed financial projections to support multiple bond issues for the Red Rock biofuels project.
- **For Duke Energy Carolinas LLC and Duke Energy Progress LLC**, Mr. Mudge provided analytic support and interrogatories in connection with Duke regulatory negotiations with solar developers.
- **For Sharyland Utilities L.P. rate case**, Mr. Mudge provided analytic support and interrogatories in connection with intervener assertions that Sharyland’s REIT structure exposed customers to incremental cost and risk.
- **For Anchorage Municipal Light & Power (ML&P)**, Mr. Mudge developed a rate stabilization plan in connection with an investment that increased ML&P’s net plant by more than 70%. The plan included design of a regulatory asset for recovery over a 35-year period. (See also Testimony, below.)
- **For St Bernard Parish, LA**, Brattle conducted historical reconstructions of peak electricity and gas demand over multiple decades (for which records did not exist).
- **For the Massachusetts Water Resources Authority (MWRA)**, in testimony before the Massachusetts Department of Public Utilities (DPU), Mr. Mudge assessed the historic and current cost of capital for a dedicated, project-financed electric transmission line owned by a subsidiary of NSTAR Electric providing delivery service to MWRA’s Deer Island water treatment facility. (See also Testimony, below.)

Robert Mudge

- **For First Solar, Xcel Energy, and the Edison Electric Institute**, Mr. Mudge developed a financial model to calculate and compare revenue requirements for utility- and residential-scale solar PV panels in the Xcel Energy Colorado system. The model reflected assumptions for technical parameters, capital and operating costs, economic assumptions such as inflation, capital sourcing (debt, equity, and tax equity), and associated costs, as well as other incentives, as applicable.
- **For an investor owned utility company in a regulatory proceeding**, Mr. Mudge assessed the rationale for and impact of preferential “load-retention” tariff requested by major industrial customer, including an analysis of customer liquidity and financing. (See also Testimony, below.)
- **For ISO-New England (ISO-NE)**, Mr. Mudge assessed the implications of ISO-NE’s proposal to integrate stronger performance incentives—referred to as “Pay For Performance”—with the existing Forward Capacity Market for the feasibility of debt and equity financing of new generation entering the ISO NE market. (See also Testimony, below.)
- **For Enel Green Power S.p.A. (Enel)**, Mr. Mudge assessed the contingent value of Enel’s ownership stake in LaGeo S.A. de C.V. (LaGeo), a geothermal development and operating company with a portfolio of assets in El Salvador. (See also Testimony, below.)
- **For an international investor in electric utility assets**, Mr. Mudge supported regulatory due diligence regarding the potential acquisition of Cleco Corporation.
- **For an investor owned utility company exploring strategic alternatives**, Mr. Mudge analyzed potential responses to distributed renewable energy projects and associated adverse effects on load growth (including potential utility ownership of distributed generation and inclusion in rate base).
- **For the New York Power Authority (NYPA)**, in connection with NYPA’s role in developing contingency plans for the potential retirement of the Indian Point Energy Center, Mr. Mudge assisted in due diligence on the feasibility of respondents’ proposals to an RFP for replacement capacity. He assessed the feasibility of proposed projects and the sponsors’ ability to complete them by a stipulated deadline. Evaluation included the assessment of site control and permitting; technical and contractual feasibility; project financial plans and sponsor capabilities; and community impact.
- **For the Connecticut Clean Energy Finance and Investment Authority/ Coalition for Green Capital**, Mr. Mudge constructed a financial model to highlight incremental benefits of potential low-cost “Green Bank” funding for solar photovoltaic projects. To be realistic about capital structure and debt carrying capacity, tax equity cash flow and tax mechanisms were explicitly developed assuming a partnership flip structure.
- **For an independent power developer seeking to sell power to an investor owned utility**, Mr. Mudge assessed the impact of the imputed debt treatment likely to be applied by rating agencies with respect to a power purchase agreement. (See also Testimony, below.)

Robert Mudge

- **For an unsecured creditor in the bankruptcy of TerreStar Networks Inc.**, Mr. Mudge assessed potential payouts based on contingencies including the outcome of litigation concerning the validity of secured creditor liens and proposed early payouts to secured creditors.
- **For TransCanada Corporation**, in testimony before the Alberta Utilities Commission (AUC), Mr. Mudge assessed bid evaluation protocols proposed by the Alberta Electric System Operator (AESO) in connection with the AESO's Competitive Process for Critical Transmission Infrastructure (CTI). (See also Testimony, below.)
- **For the Department of the Treasury**, Mr. Mudge assessed the structure and financing of a \$10 billion + cross border utility merger. The assignment included comparison of affiliate debt financing with comparable "arm's length" financing visible in the marketplace in the relevant timeframe. (See also Testimony, below.)
- **For a special litigation committee** established in connection with a shareholder lawsuit brought against a developer of renewable energy projects, Mr. Mudge assessed debt and equity financing options that could have been brought to bear to optimize shareholder returns. (See also Testimony, below.)
- **For an electric cooperative**, Mr. Mudge managed financial analysis in connection with transformative restructuring of \$1.2 billion generation and transmission electric cooperative, reporting to the CEO, CFO, and transaction counsel. The restructuring included termination of complex power supply arrangements, lease unwind, acquisition of generating assets, acquisition of new customers, related financing arrangements and securing an investment grade credit rating. The restructuring also replaced a previously existing mortgage with the Rural Utilities Service with a new senior secured indenture. (See also Testimony, below.)
- **In the formation of a renewable energy debt fund**, Mr. Mudge advised the managers on portfolio structuring, credit analysis and related protocols, and implementation.
- **In the process of a power plant sale**, Mr. Mudge managed a multi-disciplinary team in providing market analysis and financial modeling in support of a successful bid for a \$300 million generating plant asset.
- **For an LNG developer**, Mr. Mudge provided analysis and expert testimony before the state Board of Environmental Protection on project financial capacity to support environmental permitting and compliance. (See also Testimony, below.)
- **Mr. Mudge completed a financeability analysis** relating to \$2.5 billion capital project proposed to operate under long-term contract with the US Department of Energy (DOE).
- **Mr. Mudge provided analysis and expert testimony before arbitration panel** relating to costs incurred in delayed startup of a 1,000 MW merchant power plant. (See also Testimony, below.)

Robert Mudge

- **For project counsel**, Mr. Mudge developed a working finance plan and analysis to optimize construction costs for a \$1.2 billion new-build power project proposed to be owned by a consortium including IOUs, municipalities, and an electric cooperative.
- **Mr. Mudge evaluated diverse financing options for the Tennessee Valley Authority (TVA)** relating to nuclear repowering initiatives and investment in emissions control equipment, reporting to the CFO.
- **As a member of the advisory board for a start-up venture, Advanced Renewables, LLC**, Mr. Mudge advised on acquisition, development, and operation of renewable-fuel generation projects, consultation on structuring, acquisition prospects, and capitalization.
- **For a major contractor to US Department of Energy (DOE)**, Mr. Mudge provided assistance on project finance structuring and sourcing for privatized environmental projects, including creation of financeable contract structure and assembly of top-tier financing syndicate.
- **For US utility and independent energy clients**, Mr. Mudge identified and implemented asset and corporate acquisitions, including advice on valuation, due diligence, approach, and negotiations and assessment of key drivers.
- **With a major multi-lateral agency**, Mr. Mudge participated in the structuring of a debt and equity investment fund for emerging markets power projects.
- **As a project finance banker**, Mr. Mudge conducted numerous transactions domestically and abroad in electric power generation, oil and gas pipelines, and other infrastructure.

REPORTS AND PRESENTATIONS

- “Clean Energy and Sustainability Accelerator: Opportunities for Long-Term Deployment”, Prepared for the Coalition for Green Capital (with F. Graves, R. Lueken, and T. Counts), January 14, 2021.
- “FERC’s Recent Ruling(s) on PURPA: Competitive Procurement Option” Panelist, Electric Utility Consultants, Inc.’s (EUCI) Online PURPA Conference, December 15, 2020.
- “Impacts and Implications of COVID-19 for the Energy Industry: Assessment through Mid-October”, Published by The Brattle Group, Inc. (with F. Graves and J. Figueroa), November 2, 2020.
- “COVID-19 and Utility Financial Impact”, Published by The Brattle Group, Inc., September 30, 2020.
- “Supplemental Report on Wildfire Risk and AB 1054,” filed to accompany Cost of Capital Applications 19-04-014 and 19-04-015 on behalf of Southern California Edison and Pacific Gas and Electric Company, September 5, 2019.

Robert Mudge

- “California Megafires: Approaches for Risk Compensation and Financial Resiliency Against Extreme Events,” filed to accompany SCE’s TO2019A transmission owner tariff filing before FERC in Docket No. EL19-__-000 (with F. Graves), April 2019.
- “California Megafires: Approaches for Risk Compensation and Financial Resiliency Against Extreme Events,” filed to accompany PG&E’s “TO20” transmission cost of capital testimony before FERC in Docket No. EL19-13-000 (with F. Graves and M. Geronimo), October 2018.
- “Resetting FERC ROE Policy: A Window of Opportunity,” Published by The Brattle Group, Inc., (with A. Sheilendranath and F. Graves), May 2018.
- “New Tax Law and its Impact on Rates,” Panelist, Energy Bar Association Annual Meeting, May 2018.
- “The Evolving Energy Landscape: Transformation of the Power Market,” Featured Speaker, POWER Engineers Symposium, April 2018.
- “History & Legal Framework of PURPA,” Panelist, Electric Utility Consultants, Inc.’s (EUCI) Public Utilities Regulatory Policies Act 101 conference, March 2018.
- “Rising Tide of Next Generation U.S. P3s – and How to Sustain It,” Study published by The Brattle Group, Inc., (with E. Buckberg and H. Sheffield), February 27, 2018.
- “New Technologies and Old Issues under PURPA,” *Norton Rose Fulbright Project Finance Newswire*, (with M. Celebi, M. Chupka, and P. Cahill), February 20, 2018.
- “Six Implications of the New Tax Law for Regulated Utilities,” Analysis published by The Brattle Group, Inc., (with B. Villadsen and M. Tolleth), January 2018.
- “The History of PURPA and the Evolving PURPA/QF Landscape,” Panelist, Electric Utility Consultants, Inc. (EUCI) Public Utility Regulatory Policies Act of 1978 Litigation and Qualifying Facilities Symposium, November 2017.
- “Risk and Return for Regulated Utilities”, moderated panel discussion accompanying book release during NARUC Summer Policy Summit, July 18, 2017.
- “High Market-to-Book Ratios Among Regulated Utilities—A Review of Plausible Drivers”, presentation to the Center for Research in Regulated Industries Western Conference, June 29, 2017.
- “Ongoing Climate Imperative,” moderated Energy Bar Association panel discussion. November 10, 2016.
- “Energy System Optimization: The Role of Decentralization,” Panelist, Vermont Law School Alumni in Energy’s Third Annual Energy Symposium. October 6, 2016.
- “Powering America: An Analysis of Policy and Market Developments Impacting the US Power Sector”, moderated panel at American Bar Association Business Law Section Annual Meeting (with M. Celebi, Susan Nickey of Hannon Armstrong, and Elias Hinckley of Sullivan & Worcester). September 10, 2016.

Robert Mudge

- “Scaling the Economics of Solar PV,” presentation to the Wisconsin Public Utility Institute. February 25, 2016.
- “Comparative Generation Costs of Utility-Scale and Residential-Scale PV in Xcel Energy Colorado’s Service Area,” report prepared for First Solar, with support from Xcel Energy and EEI (with P. Fox-Penner, B. Tsuchida, S. Sergici, W. Gorman, and J. Schoene). July 2015.
- Distributed solar payback analysis in support of Reply Comments by Southern California Edison Company in connection with California Public Service Commission Rulemaking 12-11-005: Order Instituting Rulemaking Regarding Policies, Procedures and Rules for California Solar Initiative, the Self-Generation Incentive Program and Other Distributed Generation Issues (with M. Vilbert and J. Wharton). December 23, 2013.
- “Overview of Rooftop Solar PV ‘Green Bank’ Financing Model,” sponsored by Connecticut Clean Energy Finance and Investment Authority and the Coalition for Green Capital. January 17, 2013.
- “Can PURPA Legacy Help Utilities Manage DG Concerns?” presented at the Energy Bar Association 2013 mid-year meeting and conference. October 24, 2013.
- “ERCOT Investment Incentives and Resource Adequacy,” report prepared for the Electric Reliability Council of Texas (with S. Newell, K. Spees, J. Pfeifenberger, M. DeLucia, and R. Carlton). June 1, 2012.
- “MLPs for Renewables: Complement or Substitute for Tax Credits?,” presented at the EUCI Conference on Renewable Energy M&A Transactions, San Diego, CA, December 6, 2011.
- “Optimizing Gas for Flexible Power,” presented at the Utility Scale Flexible Power Summit, Denver, CO, September 28, 2011.

TESTIMONY

“Expert Report of Robert S. Mudge on Behalf of Shady Hills Energy Center, LLC” in matter of Shady Hills Energy Center, LLC, Plaintiff, v. Seminole Electric Cooperative, Inc., Defendant, Counter-Plaintiff, and Third-Party Plaintiff, v. Shady Hills Energy Center, LLC, Counter-Defendant, v. EFS Shady Hills Expansion Holdings, LLC, EFS Shady Hills, LLC, General Electric Credit Corporation of Tennessee, Inc., GE Capital US Holdings, Inc., GE Capital Global Holdings, LLC, Third-Party Defendants. *District Court for the Middle District of Florida Tampa Division, Case No. 8:20-cv-00081-WFJ-JSS*. February 28, 2022. Deposition taken May 20, 2022.

“Expert Report of Robert S. Mudge on Behalf of NTE Energy” in matter of Duke Energy Carolinas, LLC, Plaintiffs, v. NTE Carolinas II, LLC, NTE Carolinas II Holdings, LLC, NTE Energy LLC, NTE Southeast Electric Company, LLC, NTE Energy Services Co., LLC, and Castillo Investment Holdings II, LLC, Defendants/Counterclaimants-Plaintiffs v. Duke Energy Progress, LLC, and Duke Energy Corporation.

Robert Mudge

District Court for the Western District of North Carolina Charlotte Division, Civil Action No. 3:19-cv-515. January 14, 2022. Deposition taken March 25, 2022.

California Public Utility Commission, Proceeding A2102013. Testimony in support of the Application of Mr. John D. Grier for Authority to Sell and Transfer and CorEnergy Infrastructure Trust, Inc. to Acquire Control of Crimson California Pipeline, L.P. (PLC-26) and San Pablo Bay Pipeline Company, LLC (PLC-29) Pursuant to Public Utilities Code Section 854. November 23, 2021.

Federal Energy Regulatory Commission, Docket No. ER20-2878-000. Testimony in support of Pacific Gas and Electric Company's Proposed Rate and Non-Rate Changes to the Wholesale Distribution Tariff, FERC Electric Tariff Volume No. 4 and Related Service Agreements for Wholesale Distribution Service. September 15, 2020.

"Expert Report of Jeffrey D. Schlichting in the Matter of Arcosa Wind Towers Inc. v. Siemens Gamesa Renewable Energy, Inc. and Siemens Energy, Inc." *District Court of Dallas County, Texas, Cause No. DC-19-13334.* Assisted in preparation of report. August 3, 2020.

California Public Utility Commission, Cost of Capital Applications 19-04-014 and 19-04-015 on behalf of Southern California Edison and Pacific Gas and Electric Company. Expert report and supplemental testimony analyzing residual utility exposure to financial risk from wildfire claims in context of AB 1054. August 1, 2019 and before the Commission, September 5, 2019.

International Centre for Settlement of Investment Disputes, Case No. ARB/17/13. Confidential expert report assessing the value of Grenada Electricity Services Company Limited, March 29, 2019 and before the Tribunal, June 20, 2019.

SunEdison, Inc., Securities Litigation, 1:16-md-2742 (PKC) (AJP) (S.D.N.Y.); Horowitz v. SunEdison, Inc., 1:16-cv-7917 (PKC) SUNE. Expert report assessing adequacy of disclosure to shareholders by SunEdison management in 2015. March 1, 2019.

American Arbitration Association, International Centre for Dispute Resolution. Confidential expert report for an international engineering, procurement, and construction (EPC) contractor to estimate the fair market value of a power plant at a future date based on projected cash flows in combination with other assets and foreseeable liabilities. November 27, 2018.

Illinois Commerce Commission, Northern Illinois Gas Company d/b/a Nicor Gas Company proposed general increase in gas rates. Direct testimony on behalf of Nicor Gas, supporting an increase in gas rates. November 9, 2018.

International Centre for Settlement of Investment Disputes. Confidential expert report assessing the value of an electric utility. June 29, 2018.

Robert Mudge

Regulatory Commission of Alaska, In the Matter of the Tariff Revisions, Designated as TA357-121, filed by the Municipality of Anchorage d/b/a Municipal Light and Power Department. Direct testimony on behalf of Anchorage Municipal Light & Power (ML&P), supporting a rate stabilization plan to reallocate the recovery of investment that increased net plant by more than 70%. The plan included design of a regulatory asset for recovery over a 35-year period. December 30, 2016.

Commonwealth of Massachusetts Department of Public Utilities, Case D.P.U. 15-157. Direct testimony on behalf of the Massachusetts Water Resources Authority (MWRA) in response to the Petition and associated filings of NSTAR in Massachusetts Department of Public Utilities (D.P.U.) 15-157 with respect to appropriate project financing for dedicated electricity delivery facilities for MWRA's Deer Island water treatment facility and NSTAR's proposed tariff. February 9, 2016.

Missouri Public Service Commission, Case No. ER-2014-0258. Rebuttal testimony on behalf of Ameren Missouri in the matter of Noranda Aluminum, Inc.'s request for revisions to Ameren Missouri's Large Transmission Service Tariff to decrease its rate for electric service (as part of a general Ameren rate case). Analysis addressing Noranda's claim of imminent liquidity crisis, potential alternative capital sourcing, and Noranda's competitive position in U.S. aluminum industry. January 15, 2015.

International Centre for Settlement of Investment Disputes, Case No. ARB/13/18 (Enel Green Power S.p.A. (Enel) v. Republic of El Salvador). Expert report assessing the contingent value of Enel's ownership stake in LaGeo S.A. de C.V. (LaGeo), a geothermal development and operating company with a portfolio of assets in El Salvador, associated with Enel's rights under a shareholder agreement with the government of El Salvador. December 5, 2014.

Missouri Public Service Commission, Case No. EC-2014-0224. Rebuttal testimony on behalf of Ameren Missouri in the matter of Noranda Aluminum, Inc.'s request for revisions to Ameren Missouri's Large Transmission Service Tariff to decrease its rate for electric service. Analysis addressing Noranda's claim of imminent liquidity crisis, potential alternative capital sourcing, and Noranda's competitive position in U.S. aluminum industry. May 9, 2014.

Federal Energy Regulatory Commission, Docket Nos. ER14-1050. Testimony responding to protests, comments and testimony submitted in ER14-1050 by the New England Power Pool Participants Committee (NEPOOL) and others suggesting that ISO New England's proposal to integrate stronger performance incentives—referred to as “Pay For Performance”—with the existing Forward Capacity Market would materially hinder debt and equity financing of new generation entering the ISO-NE market. March 3, 2014.

Robert Mudge

Michigan Public Service Commission, Case No. U-17429. Direct testimony in the matter of the application of Consumers Energy Company for approval of a Certificate of Necessity for the Thetford Generating Plant and for related accounting and ratemaking authorizations. Assessment of imputed debt impact and accompanying financial risks asserted by Consumers in connection with power purchase agreements. October 29, 2013.

Alberta Utilities Commission, Application No. 1607670, Proceeding ID 1449, Alberta Electric System Operator Competitive Process Application. Written testimony assessing AESO proposed evaluation methodology for the financing component of proponents' RFP bids in connection with the Competitive Process for Critical Transmission Infrastructure (CTI). June 1, 2012.

"N.A. General Partnership v. Commissioner," Expert Report in connection with testimony before the United States Tax Court in the matter of *NA General Partnership & Subsidiaries, Iberdrola Renewables Holdings, Inc. & Subsidiaries, Successor in Interest to NA General Partnership & Subsidiaries*, Docket 525-10. April 8, 2011.

"Assessment of Powerbank Transactions – Commercial Rationale and Consistency with Allocation of 2007 Sale Proceeds," Expert Report in the matter of *Paul Bergeron, on behalf of Ridgewood Electric Power Trust V and Ridgewood Power Growth Trust v. Ridgewood Renewable Power, LLC*, C.A. No. 07-1205 BLS1. October 28, 2010.

Kentucky Public Service Commission, Case No. 2007-00455 on behalf of Big Rivers Electric Corporation, regarding the Applications of Big Rivers Electric Corporation for: (I) Approval of Wholesale Tariff Additions for Big Rivers Electric Corporation, (II) Approval of Transactions, (III) Approval to Issue Evidences of Indebtedness, and (IV) Approval of Amendments to Contracts; and of E.ON U.S., LLC, Western Kentucky Energy Corp., and LG&E Energy Marketing, Inc., for Approval of Transactions. 2007.

Testimony before the Maine Board of Environmental Protection in the matter of *Downeast LNG, Inc. and Downeast Pipeline LLC LNG Terminal and Pipeline, Robbinston, Calais, Baring PLT, Baileyville, and Princeton* L-23432-26-A-N, L-23432-TG-B-N, and A-000960-71-A-N. June 2007.

Testimony before American Arbitration Association Construction Industry Tribunal in the matter of the arbitration between *The Shaw Group/Stone & Webster, Inc. vs. New Harquahala Generating Company, LLC* Case No. 16 110Y00 242 04. 2005 and 2006.

Docket No. UE 433
Exhibit PAC/502
Witness: Robert S. Mudge

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

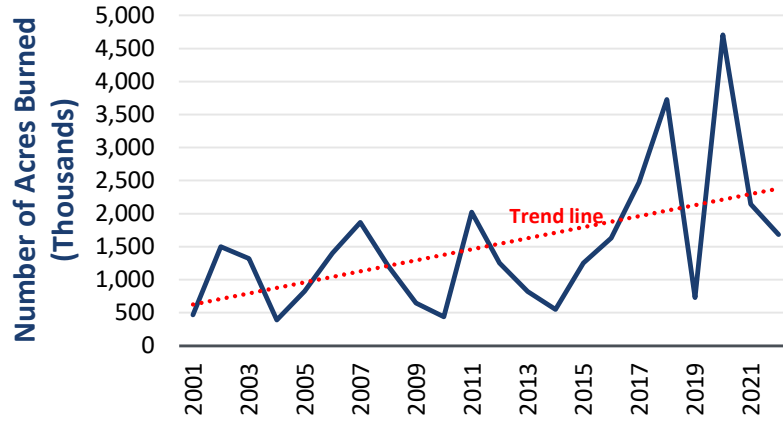
PACIFICORP

**Exhibit Accompanying Direct Testimony of Robert S. Mudge
Area Burned from Human Caused Wildfires in the West**

February 2024

Area Burned from Human Caused Wildfires in the West

Area Burned from Human-Caused Wildfires in the West



Source: National Interagency Coordination Center, <https://www.nifc.gov/fire-information/statistics/human-caused>. The west includes the Northwest, California, Northern Rockies, Great Basin, and Southwest regions.

Docket No. UE 433
Exhibit PAC/503
Witness: Robert S. Mudge

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

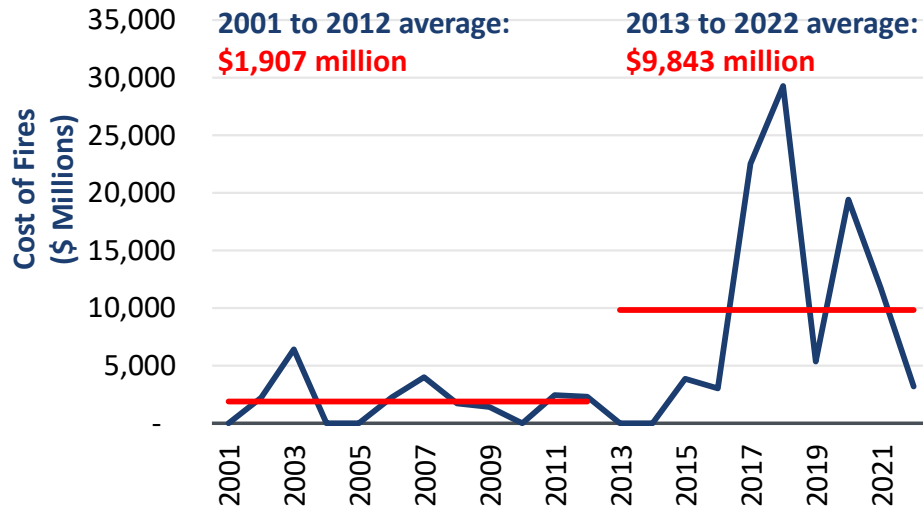
PACIFICORP

**Exhibit Accompanying Direct Testimony of Robert S. Mudge
Costs of +\$1 Billion Wildfires in the United States**

February 2024

Costs of +\$1 Billion Wildfires in the United States

Costs of +\$1 Billion Wildfires in the United States



Source: National Oceanic and Atmospheric Administration – National Centers for Environmental Information U.S. Billion-Dollar Weather and Climate Disasters (2023), <https://www.ncei.noaa.gov/access/billions/state-summary/US>.

Docket No. UE 433
Exhibit PAC/504
Witness: Robert S. Mudge

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

PACIFICORP

**Exhibit Accompanying Direct Testimony of Robert S. Mudge
Recent Costs of Wildfire Insurance Faced by Regional Utilities**

February 2024

Recent Costs of Wildfire Insurance Faced by Regional Utilities

	Units	Period							
		2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
PG&E (Wildfire Liability) [a]									
Costs	\$M	43	72	120	385	159	708	707	745
Coverage Limits	\$M	931	869	843	1,400	430	868	900	940
Costs/ Coverage	%	5%	8%	14%	28%	37%	82%	79%	79%
Cal. Year O&M Expense (excl. fuel and purchased power)	\$M	6,949	7,327	6,383	7,153	8,750	8,707	10,194	9,725
Insurance Cost/ O&M Expense	%	0.6%	1.0%	1.9%	5.4%	1.8%	8.1%	6.9%	7.7%
SCE (Wildfire) [b]									
Costs	\$M				237	400	450	413	357
Coverage Limits	\$M				990	1000	870	875	835
Costs/ Coverage	%				24%	40%	52%	47%	43%
Cal. Year O&M Expense (excl. fuel and purchased power)	\$M				2,702	2,936	3,523	3,588	4,659
Insurance Cost/ O&M Expense	%				8.8%	13.6%	12.8%	11.5%	7.7%
SDG&E (Wildfire Liability) [c]									
Costs	\$M		80	110	129	183	202	215	221
Coverage Limits	\$M		1,500	1,500	1,500	1,500	1,500	1,500	1,500
Costs/ Coverage	%		5%	7%	9%	12%	13%	14%	15%
Cal. Year O&M Expense (excl. fuel and purchased power)	\$M		1,048	1,020	1,058	1,181	1,455	1,587	1,677
Insurance Cost/ O&M Expense	%		7.6%	10.8%	12.2%	15.5%	13.9%	13.5%	13.2%
Avista (General Liability) [d]									
Costs	\$M						7	9	14
Coverage Limits	\$M						na	na	na
Costs/ Coverage	%						na	na	na
Cal. Year O&M Expense (excl. fuel and purchased power)	\$M						360	372	417
Insurance Cost/ O&M Expense	%						1.8%	2.5%	3.3%
Idaho Power (Excess Liability) [e]									
Costs	\$M				7	8	9	11	14
Coverage Limits	\$M				na	na	na	na	na
Costs/ Coverage	%				na	na	na	na	na
Cal. Year O&M Expense (excl. fuel and purchased power)	\$M				401	392	388	396	437
Insurance Cost/ O&M Expense	%				1.8%	1.9%	2.3%	2.8%	3.3%

[a] A. 21-06-021, CPUC Decision (D.) 23-01-005 at Table 2 (Jan. 17, 2023), Table 2; PG&E 10K; S&P Capital IQ.

[b] EIX Form 10-K; S&P Capital IQ.

[c] Application of San Diego Gas & Electric Company for Authority, Among Other Things, to Update its Electric and Gas Revenue Requirement and Base Rates Effective on January 1, 2024, A.22-05-016, SDG&E Prepared Direct Testimony of Dennis J. Gaughan (Corporate Center - Insurance), Table DG-18 (years 2021 and 2022 are forecasts) (May 2022).. Application of San Diego Gas & Electric Company, A.19-04-017, Exhibit No. SDG&E-05, Prepared Direct Testimony of John J. Reed and James M. Coyne at 34 (Apr. 2019); S&P Capital IQ.

[d] Avista Corporation v. WUTC, Washington Utilities and Transportation Commission (WUTC), Docket Nos. UE-220053, UG-220054, UE-210854, Rebuttal Testimony of Elizabeth M. Andrews, Table 7 (August 19, 2022); S&P Capital IQ.

[e] In the Matter of the Application of Idaho Power for an Accounting Order Authorizing the Deferral of Incremental Wildfire Mitigation and Insurance Costs, Idaho Public Utilities Commission Case No. IPC-E-21-02, filed Jan. 22, 2021; In the Matter of the Application of Idaho Power for Authority to Increase its Rates and Charges for Electric Service in the State of Idaho and for Associated Regulatory Account Treatment, Idaho Public Utilities Commission (IPUC) Case No. IPC-E-23-11, Motion for Approval of Stipulation and Settlement, October 2023; S&P Capital IQ.

Docket No. UE 433
Exhibit PAC/505
Witness: Robert S. Mudge

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

PACIFICORP

**Exhibit Accompanying Direct Testimony of Robert S. Mudge
Recent Wildfire Insurance Cost Recovery Settlements Achieved by Regional
Utilities**

February 2024

Recent Wildfire Insurance Cost Recovery Settlements Achieved by Regional Utilities

	PG&E		SCE		SDG&E		Avista	Idaho Power
Jurisdiction	CPUC		CPUC		CPUC		WUTC	IPUC
Decision/ Settlement	Application 21-06-021: DECISION APPROVING SETTLEMENT REGARDING WILDFIRE LIABILITY INSURANCE COVERAGE		Application 19-08-013: DECISION MODIFYING DECISION 21-08-036 AND ADOPTING AGREEMENT REGARDING WILDFIRE LIABILITY INSURANCE		Application No. 22-05-016: JOINT MOTION FOR ADOPTION OF A SETTLEMENT AGREEMENT RESOLVING ALL INSURANCE ISSUES		Dockets UE-220053, UG-220054, UE-210, Final Order 10/04 Rejecting Tariff Sheets; Granting Petition; Approving and Adopting Full Multiparty Settlement Stipulation Subject to Conditions; Authorizing and Requiring Compliance Filing	Case No. IPC-E-23-11, Motion for Approval of Stipulation and Settlement
Date	Jan-23		May-23		Oct-23		Dec-22	Oct-23
Status	Settlement Approved		Settlement Approved		Settlement Filed		Settlement Approved	Settlement Filed
Applicable Period	2023-2026		2023-2028		2024-2027		2023-2024	2024
Insurance Type	Self		Self		Self Option**	Commercial	Commercial	Commercial
Average Annual Losses (\$M):	Worst Case	Recent Exp.	Worst Case	App. B, Ex. 2	Worst Case			
	1,000.0	458.0	1,000.0	400.0	50.0			
Average Annual Loss Allocations (\$M):								
Preauthorized Recovery*	718.8	424.8	741.4	338.3	14.0	173.0	8.3	14.5
Shareholder Deductible	50.0	22.9	12.5	0.0				
Undercollection/ (Overcollection)	231.3	10.3	246.1	61.7				
Average Annual Loss Allocations (%):								
Preauthorized Recovery*	71.9%	92.8%	74.1%	84.6%	28.0%			
Shareholder Deductible	5.0%	5.0%	1.3%	0.0%				
Undercollection/ (Overcollection)	23.1%	2.2%	24.6%	15.4%				
Preauthorized Cost/ Target Coverage (%):						17.3%	NA	NA
Preauthorized Cost/ O&M (%)**:	7.4%	4.4%	15.9%	7.3%	0.8%	10.3%	3.3%	3.3%
Cost Deferral Mechanisms	Balancing Account		Balancing Account		Balancing Account		Balancing Account	TBD

*Varies with actual losses for self-insurance

**Embedded within commercial authorization @ \$14m per year up to \$50m.

*** WA portion for Avista