DEPARTMENT OF PUBLIC SERVICE REGULATION
BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MONTANA

IN THE MATTER OF THE Application by NorthWestern Energy for the Authority to Increase Retail Electric Utility Service Rates and for Approval of Electric Service Schedules and Rules and Allocated Cost of Service and Rate Design	REGULATORY DIVISION Docket No. D2018.2.12

PREFILED DIRECT TESTIMONY OF DAVID A. SCHLISSEL ON BEHALF OF MONTANA ENVIRONMENTAL INFORMATION CENTER ("MEIC") AND SIERRA CLUB

Department of Public Service Regulation
Montana Public Service Commission
Docket No. D2018.2.12
Electric General Rate Review
MEIC and Sierra Club

DIRECT TESTIMONY

OF DAVID A. SCHLISSEL

ON BEHALF OF INTERVENORS MONTANA ENVIRONMENTAL INFORMATION CENTER ("MEIC") AND SIERRA CLUB

TABLE OF CONTENTS

WITNESS INFORMATION

Q. Please provide your name, employer, and title.

A. My name is David Schlissel. I am the President of Schlissel Technical Consulting, Inc. and the Director of Resource Planning Analysis for the Institute for Energy Economics and Financial Analysis.

Q. Please provide a general description of your experience.

A. I graduated from the Massachusetts Institute of Technology in 1968 with a Bachelor of Science Degree in Engineering. In 1969, I received a Master of Science Degree in Engineering from Stanford University. I received a Juris Doctor degree from Stanford University in 1973. In addition, I studied nuclear engineering at the Massachusetts Institute of Technology during the years 1983-1986.

I have more than 45 years of experience providing expert analyses and testimony before utility commissions in 34 states, the U.S. Nuclear Regulatory Commission, and in state and federal court proceedings. My clients have included governmental bodies, publicly-owned utilities, and private organizations. A copy of my current C.V. is attached to this Testimony as Exhibit DAS-1.

My work since 2005 has focused primarily on the economic and financial viability of coal-fired generators, particularly those located in deregulated wholesale markets in the U.S. and those located in the western half of the nation.

Q. Have you previously testified before this Commission?

A. Yes. I testified in Docket Nos. D2013.5.33, D2014.5.46 concerning the extended outage of Colstrip Unit 4 that lasted from July 1, 2013 through January 23, 2014.

PURPOSE AND SUMMARY OF TESTIMONY

Q. What is the purpose of your testimony?

A. I have been asked to evaluate aspects of NorthWestern's application related to the Colstrip coal-fired power plant. Specifically, I have evaluated whether the $303,981,607 test period electric utility rate base being requested by NorthWestern Energy (NorthWestern or the Company) represents the current fair market value of the Company's 30 percent ownership share of Colstrip Unit 4. I also have been asked to review the prudence of the capital expenditures (capex) related to Colstrip Units 3 and 4 that NorthWestern is seeking to add to rate base in this Docket.

Q. Please summarize your principal conclusions and findings.

A. My principal conclusions and findings are that:

1. The $303,981,607 test period electric utility rate base being requested by NorthWestern does not represent the current fair market value of NorthWestern's 30 percent ownership share of Colstrip Unit 4.
2. The drastic reduction in the fair market value of NorthWestern's Colstrip interests since 2008 is due to a number of factors:

- Fundamental changes in the energy markets including significantly lower natural gas and energy market prices, growing competition from renewable energy resources, and the increasing integration of Western markets;
- Worsening operating performance at Colstrip Unit 4 that can be expected to decline further as the Unit ages;
- Substantially higher Colstrip Units 3 and 4 fixed and variable operating and maintenance costs (O&M);
- Shorter remaining service lives for Colstrip Units 3 and 4.

3. In 2013 NorthWestern recognized the sharp decline in value of Colstrip shares when it assessed the fair net present value of PPL Montana's (PPLM) 222 MW share of Colstrip Unit 3 at just over $100 million, or just $450 per kW. As Unit 3 has operated better than Unit 4, and PPLM (now Talen) shares with NorthWestern 50/50 the costs of operating each of the units, this suggests that Unit 4, at most, had a similar fair value in 2013. Continuing changes in energy markets, further increases in Colstrip's operating costs, and declines in Unit 4's performance since 2013 very likely have driven down the market values of each Unit significantly.

4. The dramatically lower current market value of Colstrip Unit 4 demonstrates that continuing to compensate NorthWestern based on the Unit's 2008 market value, as determined by the Montana Public Service Commission (PSC or the Commission), is not just and reasonable. Therefore, I concur with the primary recommendation of Ronald Binz that

the Commission should re-set the rate base amount for NorthWestern's Colstrip interests based on NorthWestern's actual costs.

5. In addition to adopting a just and reasonable rate base for NorthWestern's interest in Colstrip Unit 4, the Commission should reject NorthWestern's request to include in rate base approximately $42.6 million in capital expenditures related to Colstrip Units 3 and 4. The Company has not demonstrated that these expenditures were prudently incurred.

BACKGROUND INFORMATION

Q. Please describe any materials you have reviewed in preparation for your testimony.

A. I have reviewed the following materials: the Commission's Final Order 6925f in Docket No. D2008.6.69; NorthWestern Energy's Application in Docket No. D2008.6.69, and some of the testimony and exhibits that were submitted in that Docket; portions of NorthWestern's Application, supporting testimony, and responses to data requests in Docket No. D2013.12.85; NorthWestern's Application and supporting testimony and statements in this docket; and the non-confidential discovery requests and responses provided in response to discovery from my clients and other active parties. I also have reviewed publicly available information about natural gas and energy market prices, the cost and generation from renewable resources, and the operating costs and performance of operating coal-fired generators including Colstrip Units 3 and 4. In addition, I have reviewed a number of the filings in the current Westmoreland Coal Company bankruptcy proceeding. Finally, I have looked at Colstrip-related data in the annual FERC Form 1 submissions by each of the regulated Colstrip owners.

THE MARKET VALUE OF NORTHWESTERN'S INTEREST IN COLSTRIP UNIT 4

I. THE ROLE OF COLSTRIP UNIT 4'S MARKET VALUE IN THIS RATE CASE

Q. Why is it important to understand the current fair market value of Colstrip Unit 4?

A. As described in the testimony of Ronald Binz, NorthWestern's Application in this docket proposes to establish a rate base for NorthWestern's 30 percent share of Colstrip Unit 4 of $303,981,607 ($1,833 per kW), which reflects primarily the market value of the asset as determined by the Commission in 2008 ($407 million) through a competitive bidding process, less depreciation. It is important to understand the *current* market value of NorthWestern's 30 percent share of Colstrip Unit 4 to ascertain whether NorthWestern can justify continuing to use its 2008 valuation as the basis for customer rates.

Q. Are you asking the Commission to relitigate the market valuation of Colstrip Unit 4 adopted in Docket No. D2008.6.69?

A. Absolutely not. I am not seeking to relitigate whether $407 million was the fair market value of Colstrip Unit 4 in 2008, or whether rate-basing Colstrip Unit 4 at that amount was in the public interest and just and reasonable in 2008. Instead I am asking the Commission to determine whether, based on the dramatically changed circumstances that have occurred in energy markets and changes in

Colstrip Unit 4's operating costs and performance, $303,981,607—the amount NorthWestern proposes for its Colstrip rate base—represents the fair market value of the unit today.

In its Final Order in Docket No. D2008.6.69, the Commission found that "To force the rate-basing of CU4 as [the Montana Consumer Counsel] has advocated at a value substantially below $407 million would not result in shareholders receiving equal value to the offer from Bicent. Failure to rate base CU4 at the bid amount would result in a loss of value to shareholders who have carried the entire economic burden associated with CU4 since it began operation."[1] Thus, over the past 9+ years, NorthWestern customers have been paying the utility for the "value" of Colstrip Unit 4 as determined in 2008 (less depreciation) to ensure that shareholders received the proceeds of an investment that appeared to have been a good business decision at the time. Over that same period, vastly changed circumstances have undermined the value of that investment. Continuing to rate base Colstrip Unit 4 at a value far in excess of its current value would enrich shareholders while unjustly burdening ratepayers who have been paying all of the costs of operating and maintaining the unit for the past decade.

[1] NorthWestern Corp.'s Application for Approval of its Interest in Colstrip Unit 4 as an Electricity Supply Resource under Certain Terms and Conditions Including Certain Treatment of Net Operating Losses ("NWE 2008 App."), Docket No. D2008.6.69, Final Order 6925f ¶ 235 (Nov. 13, 2008) ("Order 6925f").

Q. What resources are available to help ascertain whether NorthWestern's Colstrip interests have maintained their 2008 market value?

A. This Commission can look to publicly available information regarding a number of variables underlying a proper discounted cash flow analysis for a generating asset such as Colstrip, many of which have changed significantly since 2008. In addition, as a key data point, the Commission can look to NorthWestern's 2013 discounted cash flow analysis performed in 2013 for PPLM's 30 percent share of Colstrip Unit 3, which NorthWestern valued at just over $100 million. Each of these is discussed below.

II. CHANGED CIRCUMSTANCES REDUCING COLSTRIP UNIT 4'S MARKET VALUE

Q. Please identify the key variables that affect the market value of Colstrip Unit 4.

A. A discounted cash flow analysis is one of the principal methods for determining fair market value of generating assets. Key variables underlying such an analysis include energy prices, market competition, the asset's electricity generation and operational statistics, the asset's remaining service life, and the fixed costs of operation (including fuel price). With respect to Colstrip Unit 4, all of these variables have changed since 2008 in ways that have reduced Colstrip Unit 4's value. Below, I address the changes in each of these variables and their effect on Colstrip Unit 4.

A. Lower Natural Gas and Energy Market Prices

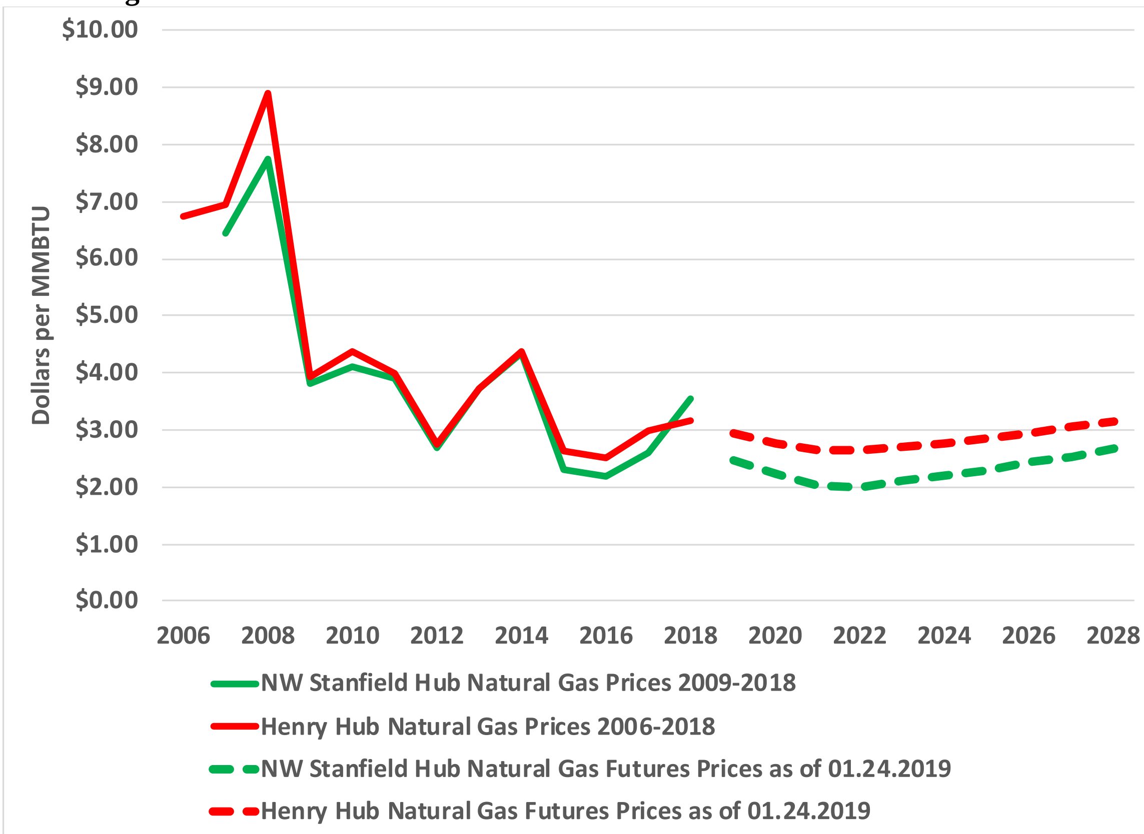
Q. What changes in the electricity markets have reduced the fair market value of Colstrip Unit 4?

A. Less than a year after the Commission issued its Final Order in Docket No. D2008.6.69 in November 2008, natural gas and energy market prices fell dramatically and they have remained very low since that time. Although there have been other factors that also have undermined the market value of Colstrip Unit 4, as I will discuss below, much lower natural gas and energy market prices have been the main reasons.

Q. Please explain how natural gas and energy market prices fell dramatically soon after the Commission issued its Final Order in Docket No. D2008.6.69.

A. Figure 1, below, shows the annual natural gas prices at the Henry Hub, which used to be the preeminent location for pricing natural gas in the U.S., and the Stanfield Hub in the Northwest. As can be seen, natural gas prices at Henry Hub declined from an average of nearly $9 per MMBTU in 2008 to approximately $4 per MMBTU in 2009, and have declined ever further since then except for episodic spikes caused, in general, by extreme weather conditions.

Figure 1: Actual and Forward Annual Natural Gas Prices 2006-2028[2]



The futures prices in Figure 1 reflect the market's current expectation that the natural gas prices will remain low for the foreseeable future.

Q. What caused this decline in natural gas prices?

A. The sharp fall in natural gas prices was the result of what has been called the Shale Revolution in which producers began producing large amounts of natural gas from shale formations at very low prices.

[2] Past natural gas prices downloaded from S&P Global Markel Intelligence. Natural Gas Futures Prices from OTC Global Holdings, also downloaded from S&P Global Market Intelligence.

Q. What impact did the fall in natural gas prices have on energy market prices?

A. As can be seen in Figure 2, below, the decline in natural gas prices between 2008 and 2009 had an almost immediate impact as both peak and off-peak energy prices at the Mid-Columbia Hub fell sharply between 2008 and 2009 and, like gas prices, generally have remained low except for episodic spikes.

Figure 2: Actual and Forward Annual Energy Prices at the Mid-Columbia Hub 2006-2028[3]

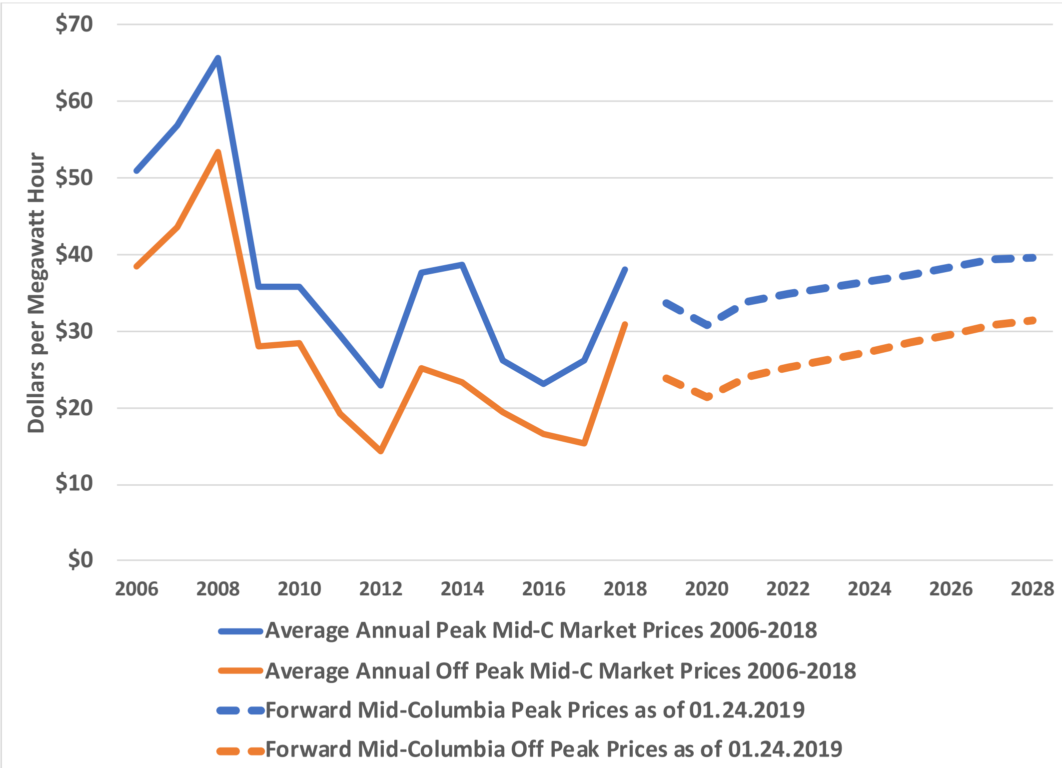


Figure 2 also shows that the market's current expectations are that energy market prices at the Mid-Columbia will remain low for the foreseeable future.

The similar shapes of the natural gas price curves shown in Figure 1 and the energy market price curves in Figure 2 are not merely coincidental. Natural gas resources have increasingly set the market prices at hubs around the nation.

[3] Past and Forward Mid-Columbia energy market prices downloaded from S&P Global Market Intelligence.

Q. Is it reasonable to expect that these declines in natural gas and energy market prices have had significant impacts on the fair market value of coal plants such as Colstrip Unit 4?

A. Absolutely, low natural gas prices have meant (1) that it has become much less expensive to produce electricity at gas-fired units, (2) that energy market prices are low because natural gas units set market clearing prices at many hubs during many hours of the year, and (3) that electricity from gas-fired units also increasingly displaced power that would have been produced at coal-fired generators. Therefore, to different degrees, the owners of coal-fired generators have found that not only have they been generating less power at their plants, they also have been getting less revenue per MWh from the power they have been producing.[4] These dynamics have been particularly devastating to merchant owners of coal plants like Talen Energy.[5]

The customers of regulated owners of coal-fired generators also have been disadvantaged by having been forced to pay more for power from coal-fired generators when there are less expensive natural gas and market alternatives available. The prospect of competing with low energy market prices has led plant

[4] See U.S. Energy Info. Admin (EIA), U.S. coal consumption in 2018 expected to be the lowest in 39 years (Dec. 4, 2018), https://www.eia.gov/todayinenergy/detail.php?id=37692 (reviewing trends).
[5] See G. Koutsonicolis, Searching for Relief from the Headaches Facing the Merchant Power Sector, Power (Sept. 6, 2018), https://www.powermag.com/blog/searching-for-relief-from-the-headaches-facing-the-merchant-power-sector/.

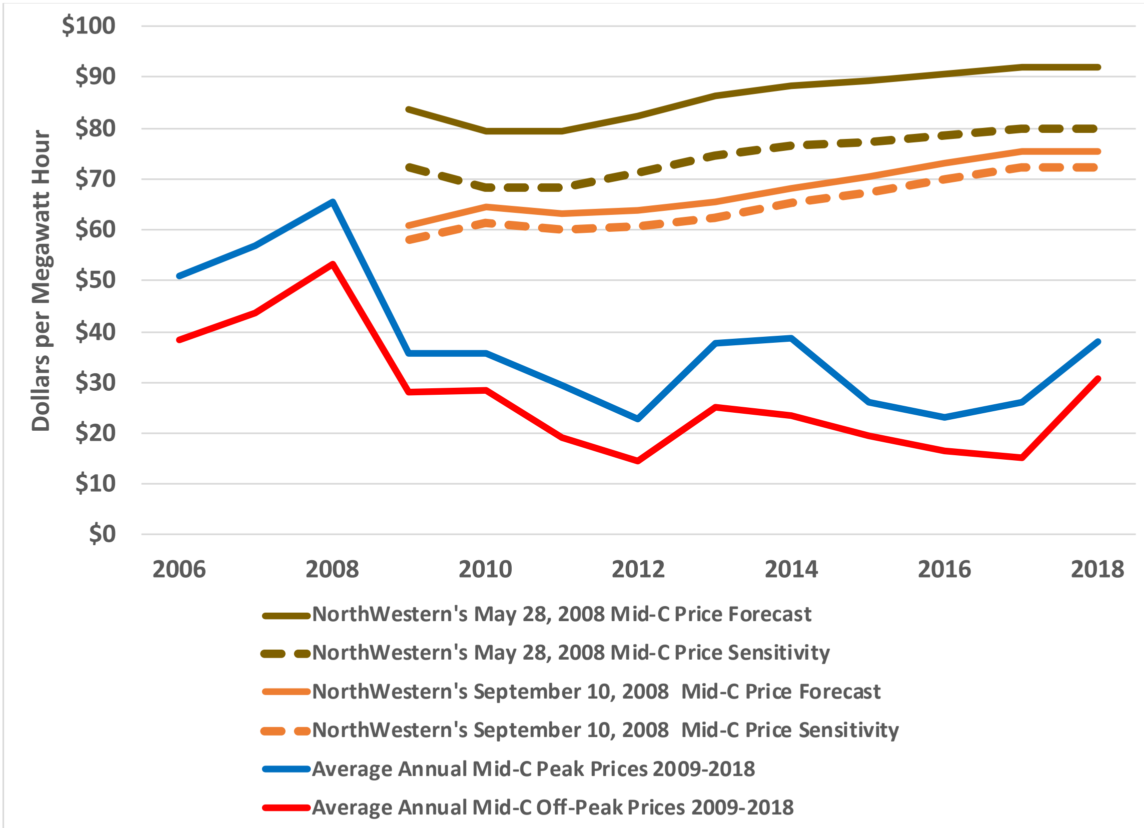
owners around the nation to retire their coal plants or to cycle them seasonally or even more frequently.[6]

Q. Did the Mid-Columbia energy market prices that NorthWestern used in the analyses it presented in Docket No. D2008.6.69 to justify the rate-basing of Colstrip Unit 4 at $407 million reflect the lower market prices that have been experienced at the Mid-Columbia Hub since 2008?

A. No. It appears that NorthWestern used a number of energy market price forecasts to justify the rate-basing of Unit 4 at a value of $407 million. Two of these forecasts were based on forward market prices as of May 28, 2008. The other two were based on forward prices as of September 10, 2008. As shown in Figure 3, below, all of these forecasts, including the two lower price sensitivities, reflected the then-current expectation that energy market prices at the Mid-Columbia Hub during the years 2009-2018 would continue to increase in future years. This expectation was proven wrong, as energy market prices actually turned out to be much lower, during both peak or off-peak periods.

[6] See EIA, U.S. coal consumption in 2018 expected to be the lowest in 39 years (Dec. 4, 2018), https://www.eia.gov/todayinenergy/detail.php?id=37692 (reviewing trends).

Figure 3: Mid-Columbia Hub Prices Forecasted by NorthWestern in Docket No. D2008.6.69 vs. Actual Market Prices in 2009-2018[7]



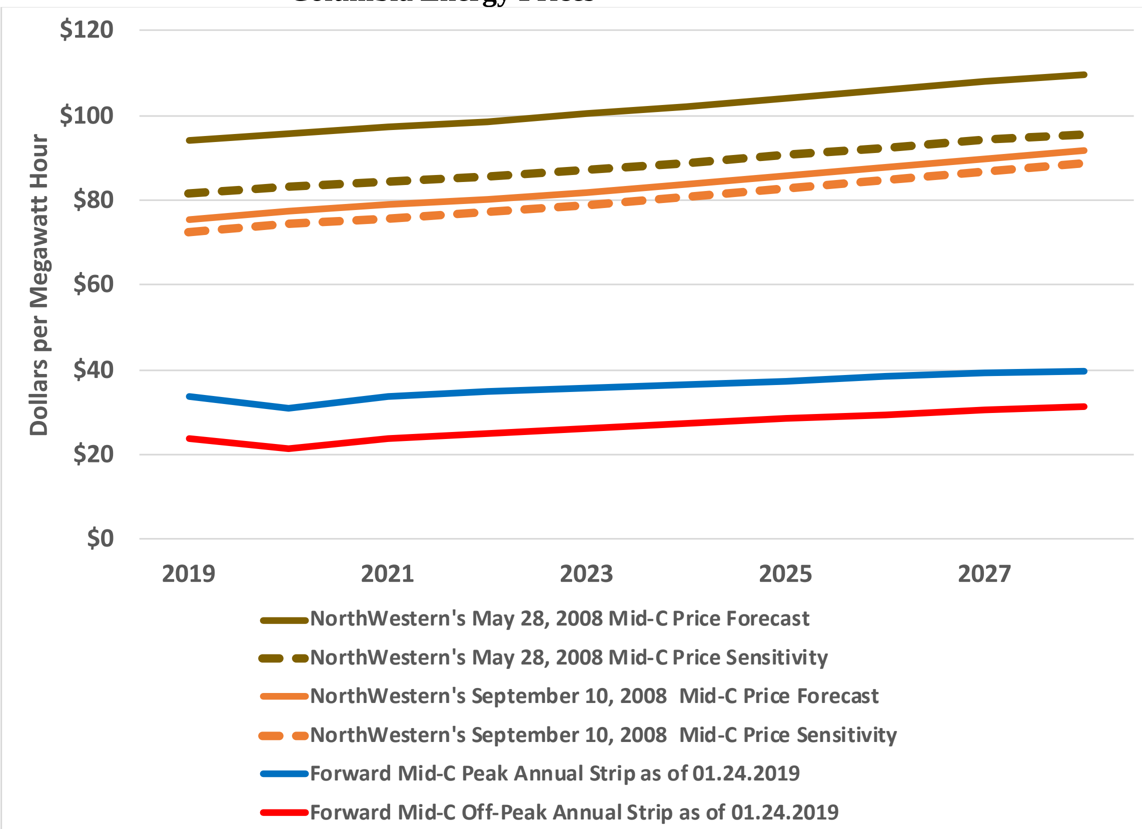
Even the lower Mid-C Price Sensitivities that NorthWestern used in Docket No. D2008.6.69 did not anticipate how much natual gas prices would collapse between 2008 and 2009, and how low they would stay over the long term.

Q. How do the forward energy market prices used in 2008 to justify the rate-basing of Colstrip Unit 4 with a $407 million value compare with the market's current expectations for future energy prices at the Mid-Columbia Hub?

[7] Actual and forward Mid-Columbia energy market prices downloaded from S&P Global Market Intelligence. NorthWestern's 2008 energy market price forecasts in Figure 3 are from the Prefiled Direct Rebuttal Testimony of John D. Hines, Exhs. JDH-4, JDH-5, Docket No. D2008.6.69.

A. The market's current expectations for future Mid-Columbia Hub prices are significantly lower than the Mid-Columbia price forecasts that the Company used in Docket No. D2008.6.69 to justify the rate-basing of Unit 4 at a value of $407 million.

Figure 4: Mid-Columbia Hub Prices Forecasted by NorthWestern in Docket No. D2008.6.69 vs. Current Market Expectations for Future Mid-Columbia Energy Prices[8]



The market's current expectation that prices at the Mid-Columbia Hub will remain low for the foreseeable future will mean a very low fair market value for NorthWestern's share of Colstrip, other things remaining the same.

[8] Id.

B. Growing Competition From Low-Cost Renewable Resources

Q. Have any other developments in energy markets driven down energy prices in recent years?

A. Yes. In recent years, increased generation from renewable resources, particularly wind and solar, have caused further declines in energy prices. Declining wind and solar installation costs have led to dramatic growth in generation from these sources, especially in the middle and western sections of the U.S. At the same time, the prices of power from new renewable resources have declined significantly, and, therefore, have become much more competitive with coal-fired generators like Colstrip Unit 4. Growth in the renewable energy sector threatens the financial viability and fair market values of coal-fired generators.[9]

Q. Please explain.

A. Installation costs for new wind and solar capacity have declined steeply in recent years. The average installed cost of wind projects has dropped 33% from a peak in 2009/2010.[10] The median installed price for utility-scale solar projects has

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[9] EIA, U.S. coal consumption in 2018 expected to be the lowest in 39 years (Dec. 4, 2018), https://www.eia.gov/todayinenergy/detail.php?id=37692 (reviewing trends).

[10] 2017 Wind Technologies Market Report, Lawrence Berkeley Nat'l Laboratory, at 49 (Aug. 2018) ("2017 Wind Technologies Market Report"), https://www.energy.gov/sites/prod/files/2018/08/f54/2017_wind_technologies_market_report_8.15.18.v2.pdf.

fallen by two-thirds over the past decade or so.[11] The installed prices for small-scale distributed solar projects have also fallen.[12]

Moreover, the performance of new renewable energy facilities has improved. Wind turbine capacity factors have increased significantly as a result of design improvements such as higher hub heights and larger turbine blades.[13] Solar capacity factors also have improved.[14] And new technologies have greatly improved the dispatchability of renewable energy resources, making them more capable than ever of reliably meeting load for utilities across the country.[15]

The declines in wind and solar installation costs and improvements in operating performance have had a number of major impacts:

1. There has been dramatic growth in the MW of wind and utility-scale solar photovoltaic (PV) resources (both utility-scale and distributed) installed in recent years.

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[11] Lawrence Berkeley Nat'l Laboratory, Utility-Scale Solar: Empirical Trends in Project Technology, Cost, Performance, and PPA Pricing in the United States, at iii (Sept. 2018) ("Utility-Scale Solar"), https://emp.lbl.gov/publications/utility-scale-solar-2016-empirical.

[12] Lawrence Berkeley Nat'l Laboratory, Tracking the Sun: Installed Price Trends for Distributed Photovoltaic Systems in the United States, at 1-2 (Sept. 2018), https://emp.lbl.gov/publications/tracking-sun-10-installed-price.

[13] 2017 Wind Technologies Market Report, at 25-37.

[14] Utility-Scale Solar, at iii.

[15] V. Knauf, How Dispatchable Wind Is Becoming a Reality in the US, GreenTech Media (Nov. 6, 2018), https://www.greentechmedia.com/articles/read/how-dispatchable-wind-is-becoming-a-reality-in-the-us (2017 study demonstrating ability of photovoltaic solar resources to deliver essential reliability services such as frequency regulation and voltage control, even without associated storage).

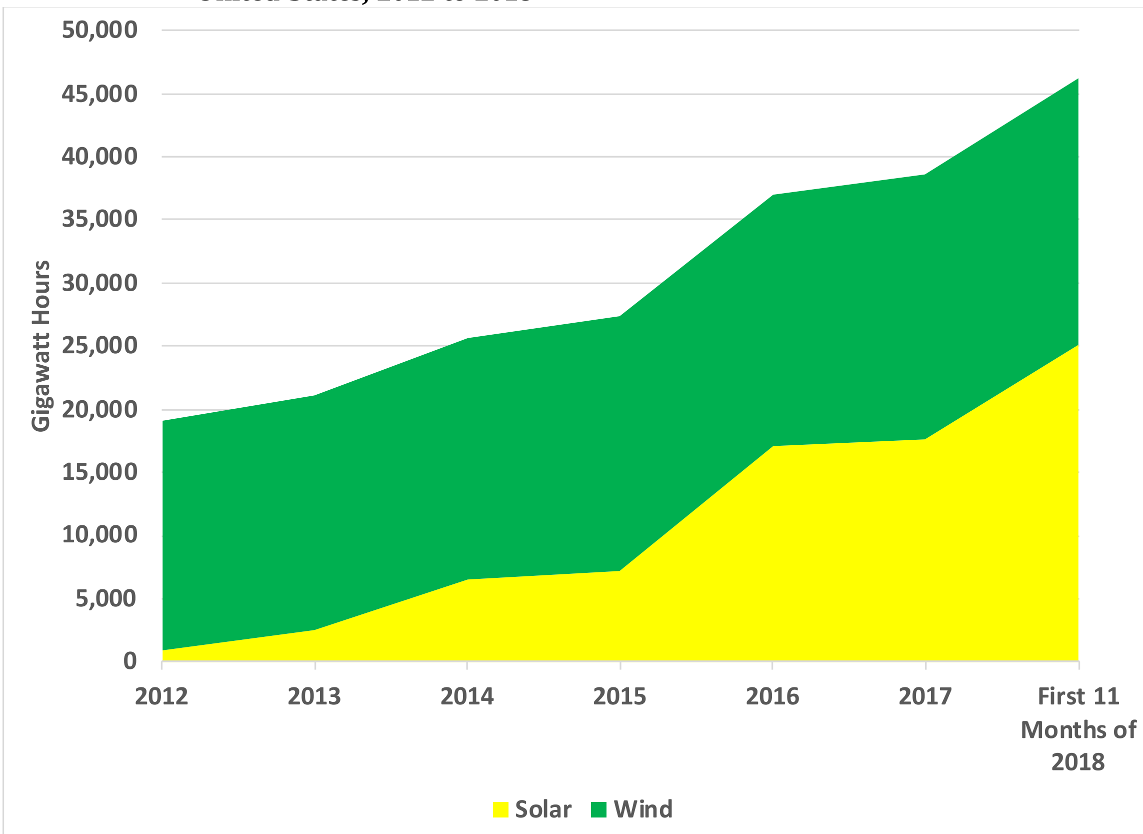
2. Generation from renewable resources has skyrocketed. Among other reasons, because of their very low or no marginal costs, wind and solar resources are often the first to be dispatched.

3. Wind and solar power purchase agreement (PPA) prices have declined sharply.

4. As a result, energy market prices have declined and generation from many coal-fired generators has been displaced.

Figure 5, below, shows the rapid growth in recent years in the generation by solar and wind resources in the U.S. Mountain States and Contiguous Pacific States.

Figure 5: The Rapid Growth in Solar and Wind Generation in the Western United States, 2012 to 2018[16]



Q. Why do you include the solar and wind generation from the Mountain States, California, Oregon and Washington State in Figure 5?

A. Efforts have been underway in recent years to increasingly integrate western electric markets. For example, a western Energy Imbalance Market (EIM) has been launched. The EIM is "a real-time wholesale energy trading market that enables participants anywhere in the West to buy and sell energy when needed."[17] Its goals include helping increase energy dispatch across balancing areas,

[16] Source: EIA *Electric Power Monthly*, https://www.eia.gov/electricity/monthly/. EIA's Electric Power Monthly includes data from Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming as part of the Mountain States region. The Contiguous Pacific States are California, Oregon and Washington

[17] https://www.westerneim.com/pages/default.aspx

reducing the need to curtail renewable generation in the California Independent System Operator (CAISO), and lowering the frequency and magnitude of negative market prices.

The growth of the EIM amplifies the risk to Colstrip from low-cost renewable resources in California and the Southwest. Three of the current owners of Colstrip already are members of the EIM – Puget Sound Energy, Portland General Electric and PacifiCorp.[18] NorthWestern is planning to join in 2021.[19] The participation of Colstrip owners in the EIM—particularly NorthWestern—means increased exposure to renewables prices that may be lower than Unit 4's marginal costs.

Q. Are more wind and solar resources likely to be added in the western U.S. in coming years?

A. Yes. California now mandates that 33% of electricity sales in 2020 and 60% of sales in 2030 be from renewable resources.[20] In addition, utilities in other states in the region also are planning to add substantial amounts of new wind and solar resources, as are independent power producers. Many of these resources will compete with Colstrip and keep energy market prices low.

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[18] Id.

[19] News Release: NorthWestern Seeks to Join Western Energy Imbalance Market; Seeks Cost Savings, Improved Grid Reliability, Improved Renewable Integration (Nov. 8, 2018), http://www.northwesternenergy.com/our-company/media-center/current/news-article/2018/11/08/NorthWestern-Seeks-to-Join-Western-Energy-Imbalance-Market-Seeks-Cost-Savings-Improved-Grid-Reliability-Improved-Renewable-Integration.

[20] Stats. 2018, Ch. 312, Sec. 2. (SB 100) (effective Jan. 1, 2019); Cal. Pub. Util. Code § 399.11.

Q. What has happened to wind and solar PPA prices in recent years?

A. Wind and utility-scale solar PPA prices have declined sharply in recent years. From 2009 to 2016, average levelized wind PPA prices fell from $70 per MWh to about $20. Average levelized solar PPA prices declined by 75% from 2009 to 2016 and were about $35 per MWh for new projects in 2016.

Solar and wind PPA prices have dropped further in 2017 and 2018. In December 2017, Xcel Energy reported that a power-generation solicitation in Colorado drew bids for renewable power that were "incredible."[21] The median bid for 17,380 MW of wind projects received by Xcel Energy was $18.10 per MWh: for 5,097 MW of wind-plus-battery storage projects, the median bid was $21 per MWh; the median bid for 13,345 MW of solar projects was $29.50 per MWh; for 10,813 MW of solar-plus-storage, the median bid was $36 per MWh.[22] And Nevada Energy reported receiving "staggering" prices in more than 100 bids for biomass, geothermal, solar, wind and battery storage projects in response to a request for proposals, with battery-backed solar projects priced below $30 per MWh.[23] For reference, as shown in Figure 2 above, average market energy prices at the Mid-Columbia Hub in 2018 were $30-40 per MWh.

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[21] https://www.utilitydive.com/news/xcel-solicitation-returns-incredible-renewable-energy-storage-bids/514287/.

[22] Public Service Company of Colorado, 2016 Electric Resource Plan 2017, All Source Solicitation 30-Day Report (Public Version), CPUC Proceeding No. 16A-0396E (Dec. 28, 2017) https://cdn.arstechnica.net/wp-content/uploads/2018/01/Proceeding-No.-16A-0396E_PUBLIC-30-Day-Report_FINAL_CORRECTED-REDACTION.pdf

[23] G. Hering, 'Staggering' prices drive NV Energy's 100% renewables bid amid ballot wrangle, S&P Global Market Intel. (Apr. 13, 2018) https://www.spglobal.com/marketintelligence/en/news-insights/trending/xrl7pjatkohn-o95bsv1pq2

Q. Are similarly low prices being paid for new renewable resources in Montana?

A. Yes. In March 2018, NorthWestern reached an agreement with Allete Clean Energy to purchase the electricity that would be produced at the 80 MW South Peak wind project. The agreement is for 15 years, has an energy price of $21.03 per MWh, and a capacity value of $474,355 per year. This works out to about an average cost of about $23-25 per MWh, depending on the project's annual capacity.[24] This is consistent with the PPA prices seen in other states in recent years.

As former Commissioner Kavulla has been quoted as saying "Wind energy is, if not the cheapest, then in a very close race with natural gas to be the cheapest source of electricity in the state of Montana."[25]

Q. What is the impact of declining renewable energy prices on the fair market value of Colstrip Unit 4?

A. As with declining natural gas prices, increasingly affordable renewable energy resources drive down market energy prices—a key factor in a discounted cash-flow analysis. These developments can be expected to continue to negatively impact the fair market value of Colstrip Unit 4 in coming years.

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[24] News Release: NorthWestern Energy: Low-cost qualifying facility to add 80-megawatts of wind to Montana portfolio (Mar. 22, 2018), http://www.northwesternenergy.com/news/2018/03/22/NorthWestern-Energy-Low-cost-qualifying-facility-to-add-80-megawatts-of-wind-to-Montana-portfolio.

[25] C. Segerstrom, Dollars and sense in the West's power market, High Country News (Dec. 21, 2018), https://www.hcn.org/articles/renewable-energy-dollars-and-sense-in-the-wests-power-market-montana.

C. Colstrip Units 3 and 4's Declining Operational Performance

Q. Please describe the Commission's assumptions regarding Colstrip Unit 4's operational performance in 2008, when it rate-based Colstrip.

A. In its analysis of NorthWestern's Application to rate-base Colstrip Unit 4 at a value of $407 million, the Commission appears to have relied on NorthWestern's representations that the unit was operating "as good as, if not better than, new in recent years" and that it was "capable of operating reliably and efficiently for the foreseeable future."[26] To support this contention, the Company had specifically represented in its Application materials that the availability and capacity factors for Colstrip Units 3 and 4 had been "steadily improving over the past 4 or 5 years," averaging "84.84% and 77.34% from 1990-2002 and 89.14% and 83.91% from 2003-2006."[27]

Q. Has the operating performance of Colstrip Unit 3 and 4 actually improved and has Unit 4 operated "reliably and efficiently" since 2008?

A. No. The operating performance of Colstrip Units 3 and 4, especially Unit 4 has not improved since Unit 4 was rate-based by the Commission. For example, Figure 6, below, shows (1) that Unit 4 has generated less energy each year than Unit 3, on average, since January 2009 and (2) that the average capacity factor for

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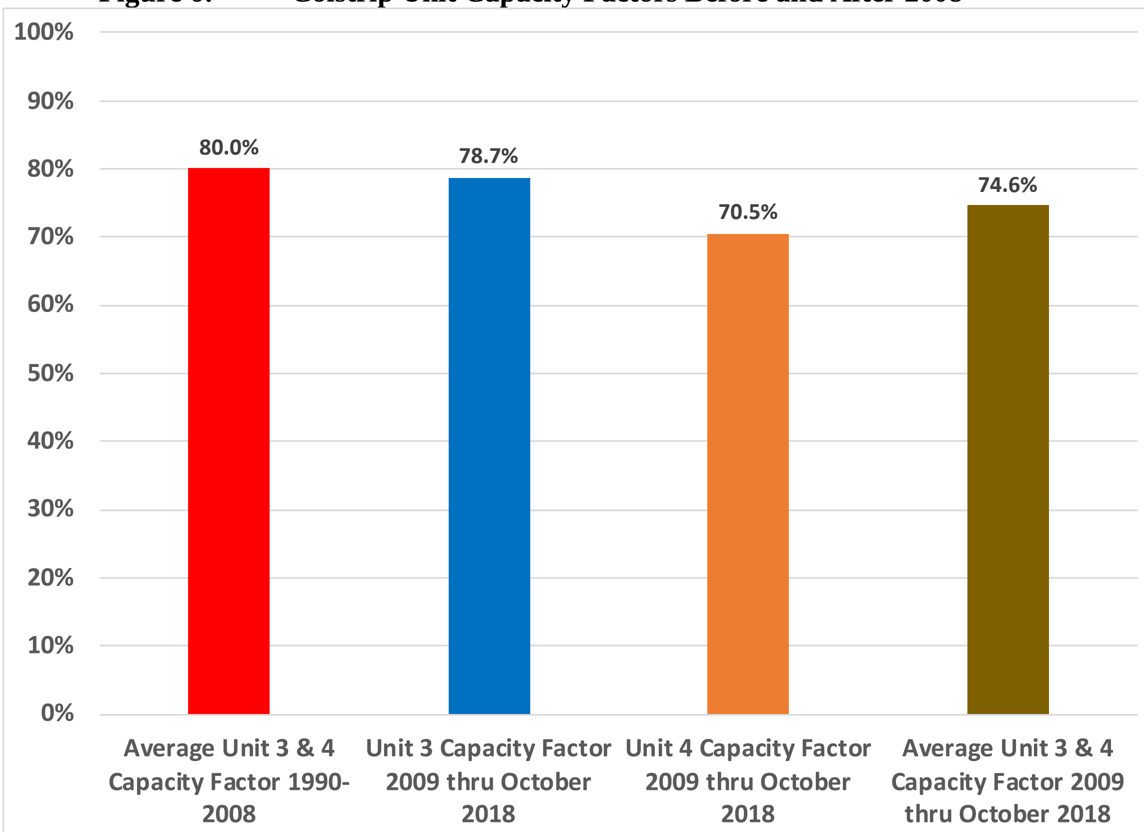
[26] Order 6925f ¶ 250; Prefiled Rebuttal Testimony of Michael J. Barnes on Behalf of NorthWestern Energy, MJB-2:1-3, Docket D2008.6.69.
[27] Prefiled Direct Testimony of Michael J. Barnes on Behalf of NorthWestern Energy, at 6-7, Docket D2008.6.69.

both Units 3 and 4 has been lower since January 2009 than it had been in the years 1990 through 2008.

Figure 6: Colstrip Unit Capacity Factors Before and After 2008[28]



Unit 4's average Equivalent Availability[29] also has been lower since January 2013 that it had been between 1990 and 2008, as shown in Figure 7, below. Figure 7 also shows that Unit 4's EAF since January 2013 has been lower, that is, worse, than Unit 3's EAF over the same period.

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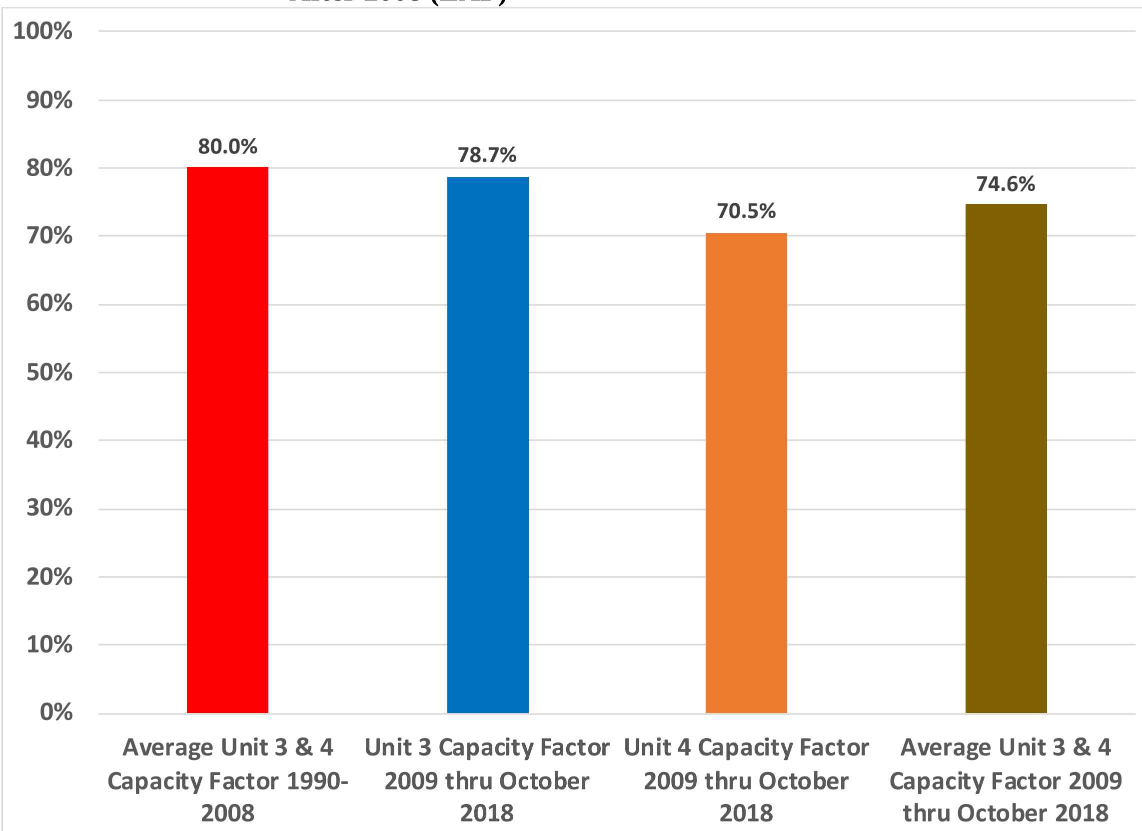
[28] Source: NWE Resp. to MEIC-011 and MEIC-012; Pre-filed Direct Testimony of Michael J. Barnes, at MJB-6 to -7, Docket D2008.6.69; Prefiled Direct Test. of Ahmad Masud on Behalf of NorthWestern Energy, Docket D2008.6.69, Exh. AM_2, at 25 (Credit Suisse *NorthWestern Corporation Colstrip Unit 4 Confidential Information Memorandum* (Feb. 2008) ("Credit Suisse Information Memorandum")).

[29] A plant's equivalent availability factor (EAF) measures how much a plant operates and takes into account planned and unplanned deratings, providing a meaningful method of tracking plant operations and comparing similar facilities.

Figure 7: Colstrip Unit 3 and 4 Equivalent Availabilty Factors Before and After 2008 (EAF)[30]



Q. Has Colstrip Unit 4 operated "reliably" since 2008?

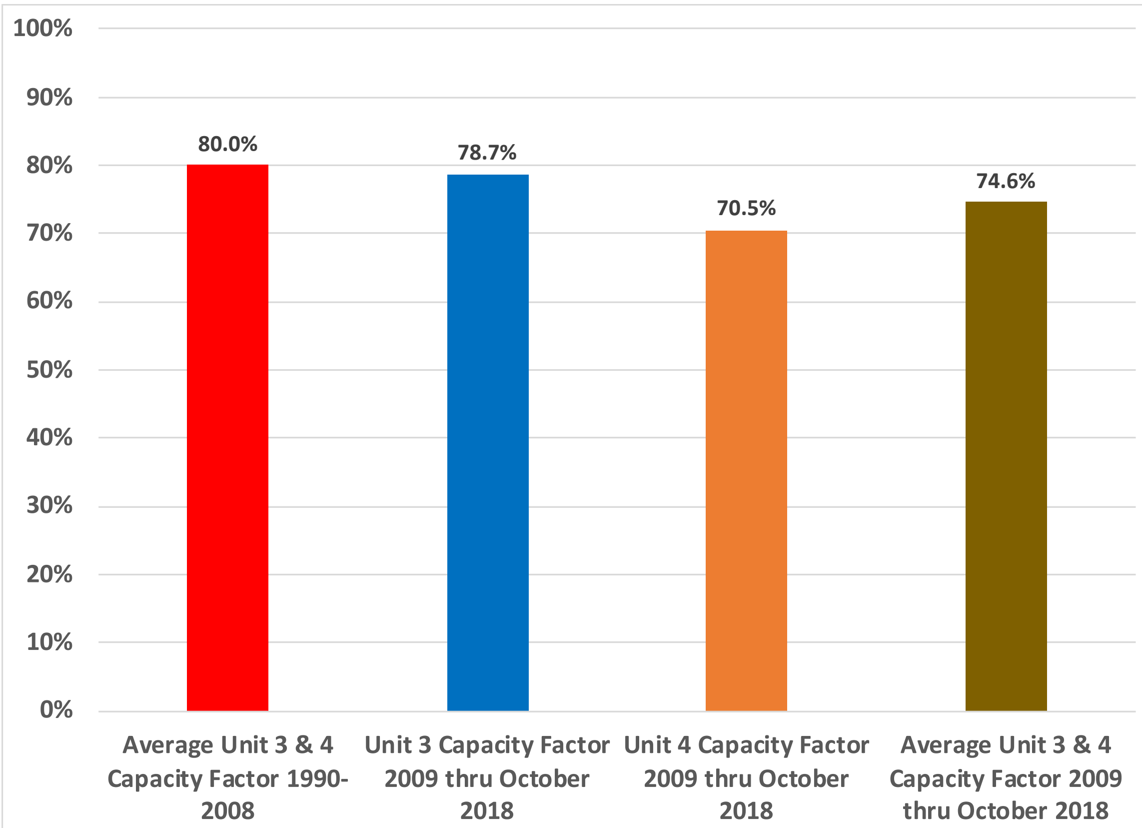
A. No. As shown in Figure 8, below, it is clear that Unit 4 did not operate reliably during the years 2013-2018, with an extremely high Equivalent Forced Outage Rate (EFOR) during this period, far higher than Unit 3 and other comparably-sized coal-fired generators.[31] Unit 4's EFOR also was substantially higher starting in January 2013 than it had been, on average, during the years 1990-2006. Thus, it appears that contrary to NorthWestern's representations that it made in 2008,

[30] Id.

[31] A plant's equivalent forced outage rate (EFOR) measures how much a plant is forced entirely or partially out A. service due to unplanned outages or deratings.

Colstrip Unit 4 has not operated "as good as, if not better than, new" and was not "capable of operating reliably and efficiently for the foreseeable future."[32]

Figure 8: Colstrip Unit 3 and 4 Equivalent Force Outage Rates (EFOR) Before and After 2008[33]



D. Increasing Colstrip Units 3 and 4 Operating Costs

Q. Are Colstrip Units 3 and 4 currently inexpensive resources for NorthWestern's ratepayers?

A. No. An analysis titled *Residential Electricity Rates of NorthWestern Energy through June 2017,* by Mr. Jason Brown from the Montana Consumer Counsel,

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[32] Prefiled Rebuttal Testimony of Michael J. Barnes on Behalf of NorthWestern Energy, MJB-2:1-3, Docket No. D2008.6.69.

[33] NWE Resp. to MEIC-011 and MEIC-012; Pre-filed Direct Testimony of Michael J. Barnes, at MJB-6 to -7 and Exh. MJB-1, at 21-22, Docket D2008.6.69; Credit Suisse Information Memorandum, at 25.

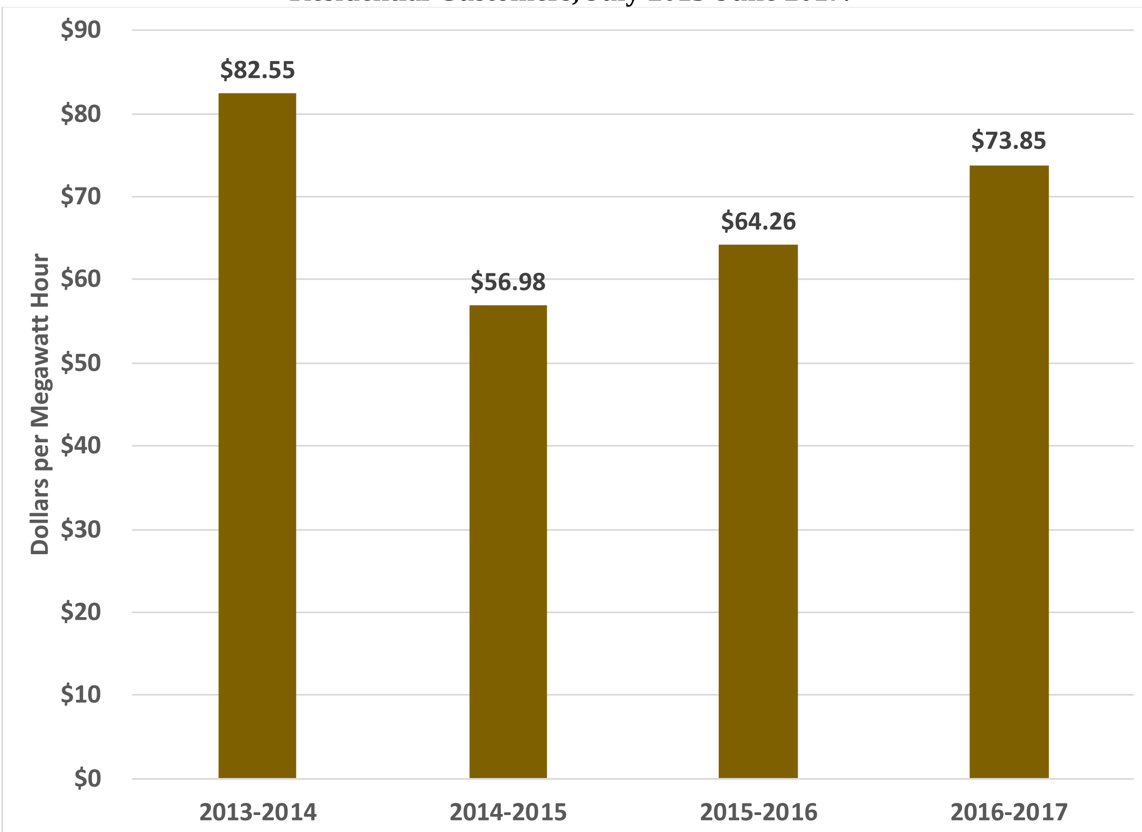
showed that Colstrip was the Company's most expensive source of power during three of the four 2-month periods between July 2013 and June 2017, and was the second most-expensive resource during a third 21-month period, July 2015-June 2016.[34] The average prices for Colstrip power for NorthWestern's residential customers during the two most recent 12-month periods were $64.26 per MWh in July 2015-June 2016 and $73.85 in July 2016-June 2017.

Q. The Company claimed, and the Commission accepted, in Docket No. D2008.6.69 that Colstrip would provide "stably priced" power.[35] Has that been true in recent years?

A. No. As can be seen from Figure 9, below, the average cost of electricity from Colstrip Units 3 and 4 for NorthWestern's residential customers was not "stable" between July 2013 and June 2017. Instead the cost of electricity showed significant volatility during the 48-month period.

[34] Exhibit DAS-2, at page 7 of 10.
[35] Order 6925f ¶ 79.

Figure 9: The Average Cost of Electricity from Colstrip for NorthWestern's Residential Customers, July 2013-June 2017.[36]



Q. Have you also looked at the average cost of Colstrip power for NorthWestern's customers in recent years?

A. Yes. Data from the Company's Application and its annual FERC Form 1 submissions shows that the average cost of the electricity for NorthWestern's customers was approximately $61.50 per MWh in 2015 and then rose to $75 per MWh in 2016 and $72.50 per MWh in 2017.

[36] Exhibit DAS-2, at 7 of 10.

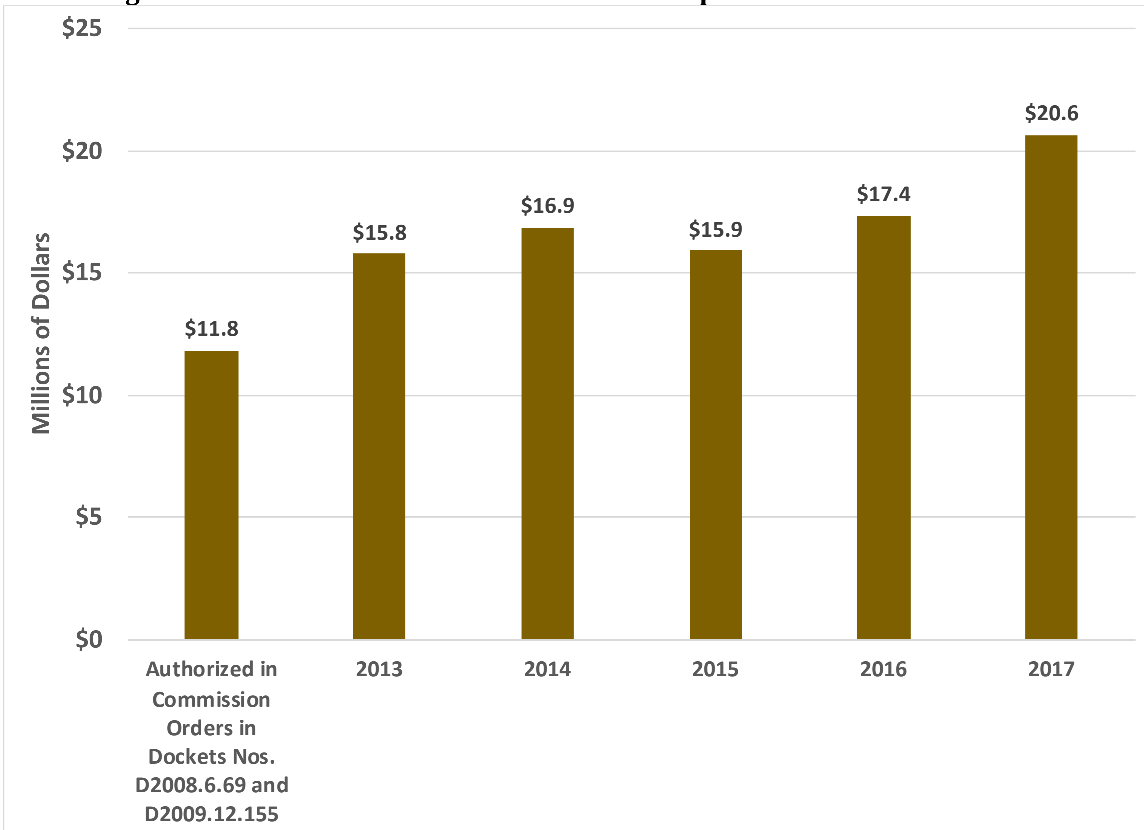
Q. Is it reasonable to expect that the cost of producing power at Colstrip will continue to rise in future years?

A. Yes. There are a number of factors that suggest that the cost of producing power at Colstrip Units 3 and 4 will continue to rise in coming years including: (1) the history of rising fixed operation and maintenance (O&M) costs; (2) the history of rising fuel costs and the uncertainty about a future coal-supply agreement; and (3) the potential impact of plant aging. These factors are discussed further below.

Q. How much have Colstrip's fixed O&M costs increased in recent years?

A. The data provided at page 59 of Statement O in the Company's Application in this Docket shows that Colstrip's annual fixed O&M costs (1) increased by an average annual rate of 6.9 percent between 2013 and 2017 and (2) were substantially higher in each of those years than the Commission authorized in Docket No. D2008.6.69 in 2008 and Docket No. 2009.12.155 in 2009.

Figure 10: NorthWestern's Share of Colstrip Unit 3 and 4 Fixed O&M[37]



Q. Is it reasonable to expect that fixed O&M costs will continue to grow in coming years?

A. Yes. I would expect the fixed O&M costs for Colstrip Units 3 and 4 to continue to increase over time although maybe not at the same rate of 6.9 percent annual growth. In my experience, rising O&M costs has been a general trend in the industry and I have seen no evidence from NorthWestern that would suggest that anything different can be expected at Colstrip.

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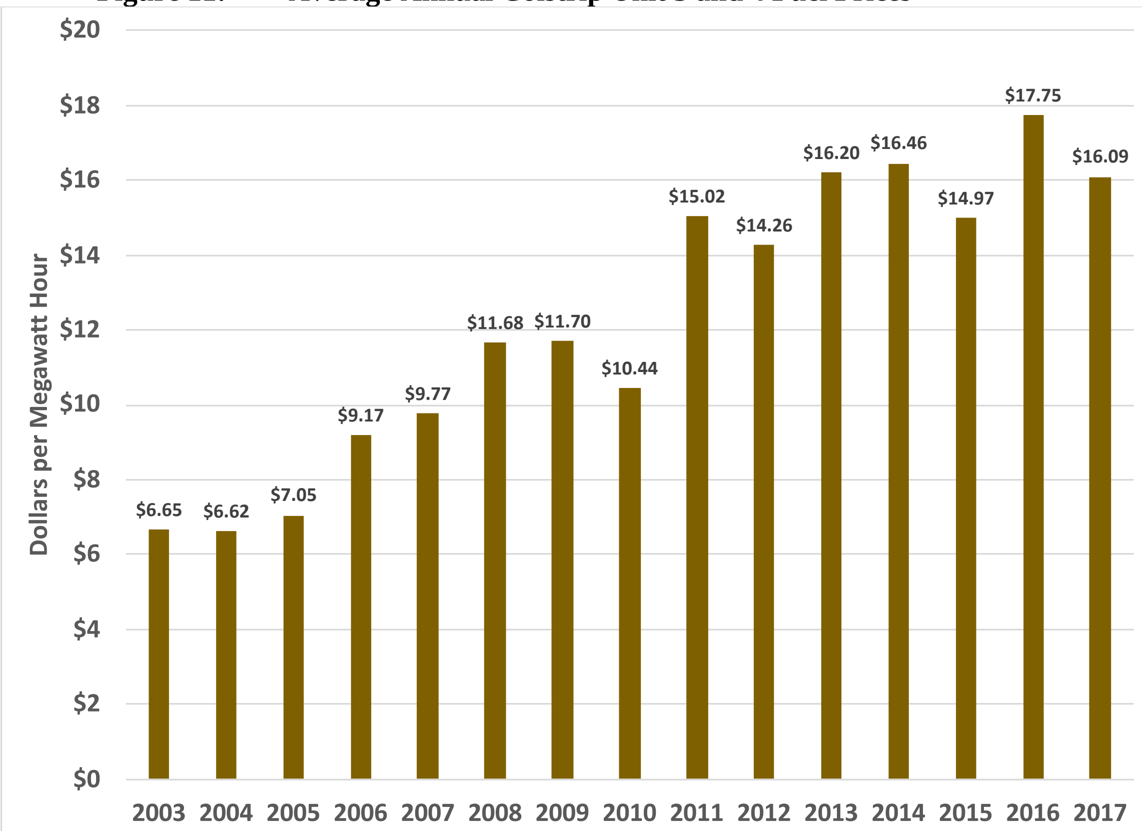
[37] Source: NWE 2008 App., Statement O, at 59 of 160.

Q. Have the Colstrip Units 3 and 4 coal costs increased over time?

A. Yes. The prices of the coal burned at Colstrip Units 3 and 4 have increased substantially over time, as shown in Figure 11, below.

Figure 11: Average Annual Colstrip Unit 3 and 4 Fuel Prices[38]



Thus, average fuel prices have increased by 142 percent since 2003 (a compound annual growth rate, or CAGR, of 6.5 percent) and by 38 percent since 2008, representing a 3.8 percent CAGR. This was much higher than the overall national escalation rate during the same period.

[38] Source: NWE 2008 App., Statement O, at 59 of 160.

Q. Are the fuel costs for Colstrip likely to continue to grow in coming years?

A. The answer is most likely yes, though there is significant uncertainty regarding future coal prices for the Units.

Q. Why is there significant uncertainty regarding the future prices of coal burned at Colstrip Units 3 and 4?

A. The current Colstrip Units 3 and 4 coal-supply agreement expires at the end of 2019. Although there have been negotiations between the Colstrip owners and the owner of the Rosebud mine, Westmoreland Coal Company, since 2012, no new agreement has been reached. These negotiations have been complicated due to the fact that Westmoreland is now in Chapter 11 bankruptcy, under which Westmoreland is selling Rosebud and three other mines Westmoreland owns to an ad hoc group of Westmoreland's secured creditors.[39]

Q. What is the current status of these negotiations?

A. The substance of the negotiations is confidential. However, there appear to be significant disagreements between the parties about the terms of a future agreement for the supply of coal to Colstrip Units 3 and 4. Or, indeed, whether there will be a future supply agreement, as Westmoreland has threatened in the Chapter 11 reorganization process to reject the current Units 3 and 4 coal-supply agreement even before its December 31, 2019 expiration.[40]

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[39] See In re. Westmoreland Coal Co. et al., Case No. 18-35672 (S.D. Tex.), *NorthWestern Energy's Objection to Joint Chapter 11 Plan of Westmoreland Coal Company and Certain of its Debtor Affiliates*, at 8, Doc. No. 1154 (Jan. 25, 2019).
[40] Id. at 10-11.

This could lead to significantly higher prices for coal for Colstrip and the possible curtailment or permanent shutdown of Colstrip, as Talen Energy has argued to the bankruptcy court:

> Instead, it appears that the WLB Debtors [i.e., Westmoreland] are threatening rejection and the withholding of vital coal to these captive Buyers [i.e., the Colstrip owners] to extract what in Talen's view are extremely unreasonable terms from them in the context of ongoing commercial negotiations focused on extending the U34 Coal Supply Agreement beyond its December 31, 2019 expiration date. **The terms reached under these coercive circumstances would be binding on the parties for many years, but at the very least would reduce the actual operational time of the Colstrip Plant by a significant amount by virtue of inflated costs.** Critically for the Buyers, the Colstrip Plant currently has one source of coal – WECO's Rosebud Mine—and the Rosebud mine has only one logical buyer of coal—the Colstrip Plant. **This monopolistic situation, involving an important product affecting the public interest—coal for power for electricity for, among other things, warmth in the winter—creates an ability for WECO to squeeze the Buyers for greater and greater profits, potentially leaving the Buyers with no choice but to agree to pay exorbinant ransom prices for many years for this vital, single-source commodity. Such a situation could lead to a drastic curtail of operations at the Colstrip Plant or potentially accelerate a permanent shutdown.**[41]

Q. What would be the impact of higher coal prices on the financial viability of continued operation of Colstrip Units 3 and 4?

A. A representative of Puget Sound Energy has explained that "The Colstrip units are under strong economic pressure from other sources of electric generation,

[41] In re. Westmoreland Coal Co. et al., Case No. 18-35672 (S.D. Tex.), *Limited Objection of Talen Montana, LLC to Confirmation of Joint Chapter 11 Plan of Westmoreland Coal Company and Certain of its Debtor Affiliates*, at 3, Doc. No. 1161 (Jan. 25, 2019) (footnote omitted) (emphases added).

especially natural gas. Anything that raises costs for Colstrip further weakens their competitiveness."[42]

Q. Is there any other reason to expect that the operating costs for Colstrip Units 3 and 4 will continue to increase in future years?

A. Yes. Colstrip Unit 4 will be 33 years old this coming April. Unit 3 is 35 years old. Both Units are more than ten years older than they were when the Commission evaluated the fair market value of Unit 4 in Docket No. 2008.6.69.

Q. Why are the ages of Colstrip Units 3 and 4 important?

A. Older plants, on average, tend to cost more to operate and maintain and are less reliable. For example, analyses by the U.S. Department of Energy's Argonne National Laboratory and the National Energy Technology Laboratory have found that coal plant heat rates increase with plant age, while plant availability declines.[43] "Heat rate" is a measure of a power plant's efficiency in generating electricity, and plants tend to become less efficient as they age. "Plant availability" measures the percentage of possible operating hours in which a plant was actually available to generate power, and plants tend to become less available to generate power as they age, in part because they tend to experience more

[42] T. Lutey, Westmoreland moves to end coal contract with Colstrip, Billings Gazette (Jan. 29, 2019), https://billingsgazette.com/news/state-and-regional/westmoreland-moves-to-end-coal-contract-with-colstrip/article_01c9a7af-9c3f-5148-ab9a-9cc95bcd6b29.html.

[43] See, e.g., U.S. Dep't of Energy, *Staff Report to the Secretary on Electricity Markets and Reliability*, at 155 (Aug. 2017), https://www.energy.gov/sites/prod/files/2017/08/f36/Staff%20Report%20on%20Electricity%20Markets%20and%20Reliability_0.pdf.

unanticipated problems and have to be shut down more frequently for unplanned outages. At the same time, older plants tend to cost more to maintain, as equipment and components degrade or fail and must be repaired or replaced. All of these factors will reduce their fair market values.

E. Shorter Remaining Service Lives of Colstrip Units 3 and 4

Q. How does the remaining service life of a generating asset affect its market value?

A. One would expect that a longer service life would produce a higher market value for a generating asset, and conversely, a shorter remaining service life would produce a lower market value.

Q. Has NorthWestern disclosed to the Commission the expected remaining service life of Colstrip Unit 4?

A. The Company has indicated that it believes the plant will operate until its 2042 depreciation date.

Q. Is it reasonable to expect that Colstrip Unit 4 will continue operating until 2042?

A. No. There is a very significant risk that Colstrip will be retired much earlier than 2042.

Q. What is the basis for this conclusion?

A. In the coming years, both Unit 3 and Unit 4 will face increasing competition from lower-cost natural gas-fired and renewable resources that will further undermine their financial viability. Continuing to operate Colstrip Units 3 and 4 in this market will hurt the ratepayers of all of the Colstrip utility owners. And it will have an even more direct effect on the bottom line for Talen, which is a merchant company that will be selling its share of Colstrip generation into markets with low energy prices. For this reason, it is hard to imagine that Talen is making significant profits on Colstrip and, consequently, that it will continue to maintain its interests of Colstrip Units 3 and 4 for the long term.

At the same time, as described below, legislation in Oregon and proposed legislation in Washington State would require that certain of the Colstrip Units 3 and 4 owners terminate their involvement in the plant well before 2042. The proposed Washington legislation, Senate Bill 5116 (and its companion bill, House Bill 1211) would require "all electric utilities to eliminate from their allocation of electricity coal-fired resources by December 31, 2025" as well as mandating that all retail sales of electricity be greenhouse gas neutral by January 1, 2030.[44] This would mandate that Puget Sound Energy and Avista eliminate their collective generation from Colstrip Units 3 and 4 from their allocation of electricity serving Washington customers by the end of 2025. Puget Sound

[44] Senate Bill 5116 Report. http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bill%20Reports/Senate/5116%20SBR%20ENET%2019.pdf.

Energy, with a 25 percent interest, is one of the largest owners of Colstrip Units 3 and 4.

In addition, a 2016 Oregon law requires that PacifiCorp cannot import coal-fired generation into that state after 2030, and Portland General Electric must cease selling coal-fired electricity no later than 2035.[45]

Q. In your opinion, what is likely to happen if the co-owners of Colstrip Units 3 and 4 stop serving their Washington and Oregon customers with electricity generated at Colstrip?

A. The Units would likely be retired as it would be unreasonable for the remaining owners to pay the higher operating costs and capital expenditures—which would be shared with a decreasing number of remaining owners—necessary to continue operating Colstrip Units 3 and 4 if Puget Sound Energy and Avista terminate their Colstrip interests in 2025 and/or PacifiCorp and Portland General Electric do the same in 2030 and 2035, respectively.

Q. Have you seen any assessments by other Colstrip Unit 3 and 4 owners in which they have evaluated the economics of retiring the Units before 2042?

A. Yes. PacifiCorp has released a preliminary analysis of its coal plants prepared as part of its 2019 integrated resource plan. The results show that continued operation of Colstrip Units 3 and 4 beyond 2022 is marginally economic –

[45] "Oregon Clean Electricity and Coal Transition Plan," 2016 Or. Laws 2016, Ch. 28 (Sen. Bill 1547), https://www.oregonlegislature.gov/bills_laws/lawsstatutes/2016orLaw0028.pdf.

continuing to operate Unit 3 beyond 2022 would have a net present value (NPV) of only $7 million, which is only a small fraction (barely three-hundreds of one percent) more cost-effective than retiring the plant in 2022. Similarly, continuing to operate Unit 4 beyond 2022 would have an NPV $8 million higher than retiring the plant in 2022.[46]

III. NORTHWESTERN'S 2013 EVALUATION OF PPLM'S 30 PERCENT SHARE OF COLSTRIP UNIT 3

Q. Why did NorthWestern evaluate the fair market value of PPLM's interest in Colstrip Unit 3 in 2013?

A. In 2012, PPLM put up for sale all of its Montana generating assets, including hydroelectric dams (hydros), the J.E. Corette coal-fired power plant, a 50 percent share of Colstrip Units 1 and 2, and a 30 percent share of Colstrip Unit 3. NorthWestern in January 2013 made a "non-conforming bid" of $740 million for just the hydros, and also made a lower bid of $400 million on PPLM's entire bundle of assets—both the hydros and coal assets. In a subsequent process, NorthWestern renewed its bid for the hydros only. In connection with its consideration of acquiring PPLM's assets, NorthWestern performed a discounted cash flow analysis for PPLM's 30 percent share of Colstrip Unit 3 to determine its fair market value.[47]

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[46] PacifiCorp, 2019 Integrated Resource Plan (IRP) Public Input Meeting, December 3-4, 2018, at Slide No. 10, https://www.eenews.net/assets/2018/12/05/document_cw_01.pdf

[47] See Prefiled Direct Testimony of Brian Bird, at BBB-6 to -12, NorthWestern Energy's Application for Approval to Purchase and Operate PPL Montana's Hydroelectric Facilities ("Hydro Application"), Docket No. D2013.12.85 (Dec. 2013), excerpts attached to the Prefiled Direct Testimony of Ronald Binz, Exhibit RJB-9.

Q. Why is the value of PPLM's 222 MW share of Colstrip Unit 3 relevant to the market value of NorthWestern's share of Unit 4?

A. NorthWestern's 2013 valuation of Unit 3 is relevant to the market value of the Company's similar share of Colstrip Unit 4 for several reasons. First, many of the variables—e.g. market energy prices and operating costs—are the same between the two units. Second, the units are comparable in age, size and design. Additionally, pursuant to the Reciprocal Sharing Agreement between NorthWestern and Talen Energy, Colstrip Units 3 and 4 are treated as a single project, with each company holding a 15 percent share of the total project.[48] As NorthWestern has explained, both companies are subject to the provisions of the overall Colstrip Ownership and Operation Agreement, "as if we were a 15% owner of the project (instead of having a 30% ownership interest on only one of the units)."[49] For example, the Colstrip costs shown on page 59 of Statement O in the Company's Application reflect 15 percent of the costs of Colstrip Unit 3 and 15 percent of the costs of Unit 4.[50] And Talen is bearing half of NorthWestern's share of the capex for Colstrip Unit 4.[51] Thus, the market values of Units 3 and 4 are intrinsically linked.

[48] NWE Resp. to MEIC-028.
[49] Id.
[50] NWE Resp. to MEIC-061.
[51] NWE Resp. to MEIC-046.

Q. What did NorthWestern determine was the net present value of PPLM's 30 percent share of Colstrip Unit 3 at that time?

A. NorthWestern's discounted cash flow analysis determined that PPLM's share of Unit 3 had a value of slightly over $100 million, or approximately $450 per kW.[52]

Q. What explanation did NorthWestern provide for its valuation of PPLM's coal assets?

A. NorthWestern explained in its December 2013 application to the Commission for approval of its purchases of PPLM's hydros:

> Due to recent Environmental Protection Agency ("EPA") actions and uncertainty around the viability of coal-fired assets in the future, particularly the older units (Corette and Colstrip Units 1 & 2), NorthWestern was concerned that not only would it be required to shut the assets down, but that it would be responsible for remediating the sites as well. As a result, we priced remediation costs into our model. Also, the Colstrip assets were subject to a sale leaseback that included terms NorthWestern considered difficult to meet in an uncertain future and that would potentially involve additional costs to buyout. [53]

For these reasons, NorthWestern focused on acquiring the hydros, but not PPLM's coal assets. Even after PPLM later agreed to buy out the sale leaseback, "[b]ased on NorthWestern's due diligence in the previous process and concerns about existing and potentially new EPA regulations affecting coal, NorthWestern decided to stay focused on the Hydros" and did not choose to purchase any of PPLM's coal assets, including Colstrip Unit 3.[54]

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[52] NWE Resp. to Data Request PSC-066, Docket 2013.12.85 (Jan. 24, 2014), attached hereto as Exhibit DAS-3.
[53] Hydro Application, Pre-filed Direct Testimony of Brian Bird, at BBB-8.
[54] Id. at BBB-9.

Q. What is the relevance of NorthWestern's 2013 valuation of Colstrip Unit 3?

A. NorthWestern's 2013 valuation of PPLM's 222 MW share Colstrip Unit 3 of roughly $100 million is a recognition by the Company that its similar 222 MW share of Colstrip Unit 4 likely declined substantially since 2008.

Q. Has Colstrip Unit 3's operational performance been worse than that of Unit 4?

A. No. In fact, as shown in Figures 6-8, above, Unit 3 has operated better than Unit 4. Given the superior operating performance of Unit 3 and the fact that NorthWestern's 30 percent of the costs and capex for the two units are shared 50/50, Colstrip Unit 3 should be expected to have a higher fair market value than Unit 4.

Q. Have the market values of Colstrip Units 3 and 4 declined since 2013?

A. Yes. The market's expectations for future natural gas and Mid-Columbia energy market prices are both significantly lower at this time than they were in June 2013. At the same time, Colstrip's fixed O&M and fuel prices have increased significantly. Moreover, the 2013 evaluation assumed that Unit 3 would generate significantly more energy than it actually produced in the years 2013-2018. Updating NorthWestern's 2013 valuation of Unit 3 to reflect (1) lower Mid-Columbia market prices, (2) less generation from Unit 3 and Unit 4, (3) higher plant operating costs; (4) higher annual depreciation (approximately $12 million per year for Unit 4 versus less than $4 million per year for Unit 3); (5) shorter remaining service lives,[55] (6) a higher discount rate (to reflect the higher rate of return given to investments in Unit 4) and (7) the lower federal corporate tax rate adopted as part of the 2017 Tax Cut and Jobs Act almost certainly would produce a significantly lower market value for NorthWestern's 30 percent share of Unit 4 than NorthWestern calculated for PPLM's 30 percent share of Unit 3 in 2013.

IV. CONCLUSION REGARDING COLSTRIP UNIT 4'S FAIR MARKET VALUE

Q. Please summarize your conclusion regarding the current fair market value of NorthWestern's 30 percent interest in Colstrip Unit 4.

A. The fair market value of NorthWestern's 30 percent share of Colstrip Unit 4 has declined dramatically due to changed circumstances since 2008, including much lower energy market prices, declining operational performance, increasing fixed and variable O&M costs, and the Unit's shortened remaining service life. All of these factors are important variables in a discounted cash flow analysis, and they all have undermined the value of Colstrip Unit 4. Indeed, NorthWestern recognized these factors when it determined that the net present value of PPLM's 30 percent share of Colstrip Unit 3 in 2013 was just over $100 million. Based on my analysis, it is apparent that the market value of NorthWestern's share of Colstrip 4 has continued to decline since 2013, and is below $100 million. Thus, while NorthWestern's customers are currently paying rates that were designed to

[55] Even with an assumed retirement date of 2042, Units 3 and 4 each have shorter remaining lives in 2019 than they did in 2013 simply because there are fewer years between 2019 and 2042.

capture the 2008 value of Colstrip Unit 4, the justification for those high rates no longer exists.

Q. What is your recommendation?

A. Consistent with the recommendation of Ronald Binz, I urge the Commission to re-set rates for Colstrip Unit 4 based on the costs to NorthWestern of that asset, rather than an obsolete and exorbitant assessment of fair market value. If, however, the Commission decides to retain the market value approach to Colstrip rates, it should require NorthWestern to analyze the current value of Colstrip Unit 4, taking into consideration the changed circumstances discussed above.

CAPITAL EXPENDITURES

Q: Please describe NorthWestern's request to place Colstrip-related capital expenditures into rate base.

A: NorthWestern seeks to include in its rate base $42.6 million in capital expenditures ("capex") for projects related to Colstrip Units 3 and 4 that were placed into service between January 1, 2009 and December 31, 2017.[56] It appears that NorthWestern seeks to recover from ratepayers all of its expenses for Colstrip Units 3 and 4 since Unit 4 was first put in rate base in 2008.

[56] NWE Resp. to MEIC-003 (updated Dec. 18, 2018).

Q: Please summarize your recommendations regarding NorthWestern's request to rate base $42.6 million for Colstrip-related capex.

A: The Commission should not include any Colstrip capex in rate base. First, as described in the testimony of Ronald Binz, if the Commission declines to adjust the Colstrip rate base to eliminate the windfall to NorthWestern shareholders originating from the 2008 market valuation, NorthWestern should not be able to charge customers for its Colstrip capex because it would not result in just and reasonable rates. Second, even if the Commission does appropriately adjust the Colstrip rate base, the Commission should not rate base NorthWestern's $42.6 million of additional capex because, as described below, NorthWestern has not shown that the capex projects were reasonably necessary to the prudent operation and management of the plant.

Q: Has NorthWestern attempted to justify its Colstrip capex expenditures?

A: In its application and pre-filed direct testimony, no. However, in response to data requests, NorthWestern suggested that all of its capex was prudent because the projects were recommended by Talen, the plant operator. NorthWestern explained that Talen is responsible for determining what capital additions are necessary and proposes a budget, which the remaining owners discuss "if they deem it necessary" and approve.[57] In response to an MEIC and Sierra Club data request asking for "NorthWestern's justification for why [certain] capital expenditures were necessary to NorthWestern's reasonable management or operation of

[57] NWE Resp. to MEIC-047.

Colstrip Unit 3 and/or 4," NorthWestern cited Talen's "vast expertise in operating fossil fuel-fired generation facilities."[58]

Q: Is it reasonable for NorthWestern to rely on Talen's "expertise" to justify its capex?

A: In my opinion, no. The Commission previously rejected NorthWestern's similar attempt to rely on Talen to satisfy NorthWestern's obligation to reasonably manage Colstrip Unit 4 when it denied NorthWestern's request to charge customers for replacement power costs associated with an extended Unit 4 outage in 2013-2014. The Commission explained, "it is NorthWestern that is accountable under statutory and Commission requirements regarding the prudent operation and maintenance of CU4…. NorthWestern may be able to delegate the operation of its property to a contractor, but it cannot outsource its statutory and regulatory obligations as a public utility to prove the prudence of costs resulting from its property's failure."[59] In other words, simply following Talen's recommendations is insufficient to demonstrate the prudence of NorthWestern's expenditures.

Q: Has NorthWestern provided any documentation to explain the capital projects for which it is seeking recovery?

A: In response to MEIC and Sierra Club's data requests, NorthWestern has provided minutes from Colstrip owners' meetings, capital project authorization forms, and minimal additional documentation related to capital projects since 2009.

[58] NWE Resp. to MEIC-072.
[59] Order No, 7283h ¶ 67, Dockets D2013.5.33 and D2014.5.43 (May 13, 2016).

Q: Does this documentation demonstrate that the capex NorthWestern seeks to add to rate base was prudently incurred?

A: In my opinion, no. First, the owners' meetings minutes provided by NorthWestern in response to MEIC-047(b) show only that the capital budget for Colstrip Units 3 and 4 in any given year were approved, without documenting any critical inquiry by the Colstrip co-owners. For most years, the budgets were approved unanimously. However, for at least one year, 2016, the minutes reveal that the capital budget was approved by a majority—but apparently not all—Colstrip owners.[60] But even when one or more owners apparently disagreed with Talen's capital budget recommendation, the minutes do not describe any discussion among the owners of the reasonableness of the budgets or necessity of the capital projects. Indeed, MEIC and Sierra Club specifically asked NorthWestern to "state whether any Colstrip owner voted to disapprove" certain expenditures in 2016 associated with a Colstrip Unit 4 overhaul and requested all documentation that references such owner's rationale.[61] NorthWestern stated in response that it "is not aware of a 'vote to disapprove'" the 2016 Colstrip Unit 4 overhaul expenses and offered no explanation for owners' meeting minutes that appear to contradict NorthWestern's answer.

Nor do the capital project authorization forms provided in response to MEIC-047(a) demonstrate the reasonableness of its capital projects and expenditures. In

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[60] See NWE Resp. to MEIC-047(b), Attachment, Minutes of Nov. 18, 2015 Owners Meeting.

[61] See NWE Resp. to MEIC-077(d) (cross-referencing MEIC-057 regarding the 2016 Colstrip Unit 4 overhaul expenses and NWE's response to MEIC-072(d)).

general, the single-page form for each project provides a brief summary of the project, estimated costs, and a "hurdle rate evaluation" that identifies the "profitability index" for the project. However, the forms do not evaluate project alternatives, or provide any perspective on the cumulative costs and benefits of a suite of projects over the period of a budgeting year, or longer. Such a cumulative cost-benefit analysis is important because, while a given project may appear reasonable in isolation, a large number of costly repairs and maintenance projects on a single generating resource may not appear reasonable in light of the expected remaining operating life of that resource or other factors. As an example, NorthWestern's capex in 2017 was approximately $10.2 million—more than double the annual average capex in 2009-2016 of just over $4 million.[62] NorthWestern did not provide any documentation to show that it investigated—or even inquired—why capex increased so significantly in 2017. And there is no evidence that NorthWestern analyzed potential alternatives, such as deferring or eliminating some of those projects. Absent such analyses, NorthWestern cannot show that it exercised prudence in its management and oversight related to Colstrip expenditures.

Q: Do you have concerns related to specific Colstrip-related capital expenditures?

[62] NWE Resp. to MEIC-003 (updated Dec. 18, 2018).

A: Yes. While the lack of documentation for all of NorthWestern's Colstrip-related capex since 2009 generally suggests that NorthWestern has not prudently managed the plant, I have the following specific concerns:

- NorthWestern requests that the Commission add to rate base capex related to an extended outage of Colstrip Unit 4 in 2013 and 2014 that the Commission has already determined was the result of imprudent management by NorthWestern. Specifically, NorthWestern includes $57,787.67 for "MainTurbineMechOverspeed, U4," which went into service June 26, 2013 (Project ID 10017215).[63] Originally, NorthWestern also included the costs of two additional outage-related projects (Project IDs 10012230 and 10020809) that totaled $3,574,606.42, but removed the cost of those projects in its revised response to MEIC-003 to account for insurance proceeds for that outage, amounting to $3.9 million.[64] My concerns with NorthWestern's approach are two-fold. First, NorthWestern should not be allowed to collect $57,787.67 in connection with an outage that this Commission found to have resulted from NorthWestern's imprudent management and operation of Colstrip Unit 4.[65] Second, NorthWestern has not sought to reconcile its reported insurance proceeds of $3.9 million and its removal of just under $3.6 million from the rate base. NorthWestern's proposal would result in its over-collection of more than $300,000. None of NorthWestern's capex related to the 2013-14

[63] See NWE Resp. to MEIC-003, Attachment (updated Dec. 18, 2018); NWE Resp. to MEIC-053(a)-(b).
[64] See NWE Resp. to MEIC-003, Attachment (original); NWE Resp. to MEIC-053(d).
[65] Order No. 7283 ¶ 57, Docket D2013.5.33/D2014.5.46 (May 13, 2016).

outage is reasonable, and the Commission certainly should not allow NorthWestern to profit from the outage by pocketing excess insurance proceeds.

- NorthWestern is seeking to recover approximately $3.3 million for the installation in 2016 and 2017 of "Smartburn" pollution controls on Colstrip Units 3 and 4 that were purportedly designed to "provide[] a compliance margin" for a NOx emission limit in Colstrip's air permit.[66] However, NorthWestern conceded that Colstrip Units 3 and 4 have not violated their permitted NOx emission limit since Colstrip Unit 4 has been in rate base and that there is no current regulatory requirement to reduce its NOx emissions.[67] The only regulatory provision NorthWestern points to is a goal of the federal regional haze program to achieve natural visibility conditions by 2064—well past the date when NorthWestern expects Colstrip to cease operation.[68] Indeed, in notes from the owners' meeting discussion of this topic, NorthWestern's representative recorded a question about the timing of the NOx-control upgrades, observing that "RH [regional haze] review will not occur until 2021" and questioning whether the owners might make a "[$]13.6 million deferral."[69] There is no indication that answers regarding those timing questions were ever

[66] NWE Resp. to MEIC-056(c).
[67] NWE Resp. to MEIC-071(a), (c).
[68] NWE Resp. to MEIC-071(c).
[69] NWE Resp. to MEIC-056(e), Attachment.

provided. Moreover, the controls have yielded minimal NOx reductions.[70] The record suggests no discussion of whether, if NOx controls were justified at all, more effective pollution controls would be appropriate in lieu of the less-effective (but still expensive) controls recommended by Talen. In sum, the "Smartburn" controls were discretionary and ineffective, and at best premature. The evidentiary record provides no basis on which the Commission could determine that NorthWestern's "Smartburn" expenditures in 2016 and 2017 were prudent.

Q: What is your recommendation to the Commission related to Colstrip capital expenditures?

A: The Commission should reject NorthWestern's request to rate base these capital expenditures related to the Colstrip Unit 4 outage and "Smartburn" controls, as discussed above. However, while these are some of the more egregious examples of NorthWestern's failure to document the reasonableness of its expenditures, they serve to highlight the problems inherent in NorthWestern's approach of deferring entirely to Talen's recommendations. Not only with respect to the Unit 4 outage and "Smartburn" controls—but with respect to all Colstrip capex NorthWestern seeks to add to rate base—NorthWestern's hands-off approach has left it unable to show that it exercised prudent judgment and oversight. Therefore,

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[70] NWE Resp. to MEIC-071(b) (stating that NOx emissions were reduced from 95% of the permitted NOx emission rate of 0.18 lb NOx per MMBtu over a 30-day rolling average (or 0.17 lb/MMBtu), down to 83-89% of the permitted rate (or 0.15-0.16 lb/MMBtu). For reference, the U.S. Environmental Protection Agency has found that more effective control technology (selective catalytic reduction, or SCR) can achieve an annual average NOx emission rate of 0.05 lb/MMBtu. See Proposed Rule, Montana Regional Haze, 77 Fed. Reg. 23,988, 24,024 (Apr. 20, 2012).

the Commission should reject NorthWestern's request to rate base all $42.6 million in Colstrip capex.

Q. Does this complete your testimony?

A. Yes.

Direct Testimony and Exhibits of

David A. Schlissel

on behalf of MEIC and Sierra Club

Exhibit DAS-1

David A. Schlissel

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SUMMARY

I have worked since 1974 as a consultant and attorney on complex management, engineering, and economic issues, primarily in the field of energy. This work has involved conducting technical investigations, preparing economic analyses, presenting expert testimony, providing support during all phases of regulatory proceedings and litigation, and advising clients during settlement negotiations. I received undergraduate and advanced engineering degrees from the Massachusetts Institute of Technology and Stanford University, respectively, and a law degree from Stanford Law School.

PROFESSIONAL EXPERIENCE

Electric Resource Planning - Analyzed the financial and economic costs and benefits of energy supply options. Examined whether there are lower cost, lower risk alternatives than proposed fossil and nuclear power plants. Evaluated the financial, economic and system reliability consequences of retiring existing electric generating facilities. Investigated whether new electric generating facilities are used and useful. Investigated whether new generating facilities that were built for a deregulated subsidiary should be included in the rate base of a regulated utility. Assessed the reasonableness of proposed utility power purchase agreements with deregulated affiliates. Investigated the prudence of utility power purchases in deregulated markets.

Coal-fired Generation – Evaluated the economic and financial risks of investing in, constructing and operating new coal-fired power plants. Analyzed the economic and financial risks of making expensive environmental and other upgrades to existing plants. Investigated whether plant owners had adequately considered the risks associated with building new fossil-fired power plants, the most significant of which are the likelihood of federal regulation of greenhouse gas emissions and construction cost increases.

Power Plant Air Emissions – Investigated whether proposed generating facilities would provide environmental benefits in terms of reduced emissions of NO_x, SO_2 and CO_2. Examined whether new state and federal emission standards would lead to the retirement of existing power plants or otherwise have an adverse impact on electric system reliability.

Power Plant Water Use – Examined power plant repowering as a strategy for reducing water consumption at existing electric generating facilities. Analyzed the impact of converting power plants from once-through to closed-loop systems with cooling towers on plant revenues and electric system reliability. Evaluated the potential impact of the EPA’s Proposed Clean Water Act Section 316(b) Rule for Cooling Water Intake Structures at existing power plants.

Electric System Reliability - Evaluated whether existing or new generation facilities and transmission lines are needed to ensure adequate levels of system reliability. Investigated the causes of distribution system outages and inadequate service reliability. Examined the reasonableness of utility system reliability expenditures.

Power Plant Repowering - Evaluated the environmental, economic and reliability impacts of rebuilding older, inefficient generating facilities with new combined cycle technology.

Power Plant Operations and Economics - Investigated the causes of more than one hundred power plant and system outages, equipment failures, and component degradation, determined whether these problems could have been anticipated and avoided, and assessed liability for repair and replacement costs. Examined power plant operating, maintenance, and capital costs. Evaluated utility plans for and management of the replacement of major power plant components. Assessed the adequacy of power plant quality assurance and maintenance programs. Examined the selection and supervision of contractors and subcontractors.

Nuclear Power – Reviewed recent cost estimates for proposed nuclear power plants. Examined the impact of the nuclear power plant life extensions and power uprates on decommissioning costs and collections policies. Examined the reasonableness of utility decisions to sell nuclear power assets and evaluated the value received as a result of the auctioning of those plants. Investigated the significance of the increasing ownership of nuclear power plants by multiple tiered holding companies with limited liability company subsidiaries. Investigated the potential safety consequences of nuclear power plant structure, system, and component failures.

Transmission Line Siting – Examined the need for proposed transmission lines. Analyzed whether proposed transmission lines could be installed underground. Worked with clients to develop alternate routings for proposed lines that would have reduced impacts on the environment and communities.

Electric Industry Regulation and Markets - Examined whether generating facilities experienced more outages following the transition to a deregulated wholesale market in New England. Evaluated the reasonableness of nuclear and fossil plant sales, auctions, and power purchase agreements. Analyzed the impact of proposed utility mergers on market power. Assessed the reasonableness of contract provisions and terms in proposed power supply agreements.

Expert Testimony - Presented the results of management, technical and economic analyses as testimony in more than 100 proceedings before regulatory boards and commissions in 35 states, before two federal regulatory agencies, and in state and federal court proceedings.

Litigation and Regulatory Support - Participated in all aspects of the development and preparation of case presentations on complex management, technical, and economic issues. Assisted in the preparation and conduct of pre-trial discovery and depositions. Helped identify and prepare expert witnesses. Aided the preparation of pre-hearing petitions and motions and post-hearing briefs and appeals. Assisted counsel in preparing for hearings and oral arguments. Advised counsel during settlement negotiations.

TESTIMONY, AFFIDAVITS, DEPOSITIONS AND COMMENTS

West Virginia Public Service Commission (Case No. 17-0296-E-PC) – August 2017
The reasonableness of Monongahela Power's proposed acquisition of the 1,300 MW Pleasants Power Plant.

Indiana Utility Regulatory Commission (Cause No. 44794) – October & December 2016
The economic viability of proposed environmental upgrades at the Petersburg Power Station.

Montana Public Service Commission (Docket Nos. D2013.5.33 and D2014.5.46) – May 2015
The circumstances surrounding the extended outage of Colstrip Unit 4 from July 1, 2013 through January 23, 2014.

Indiana Utility Regulatory Commission (Cause Nos. 43114 IGCC 12 & 13) – December 2014
Whether Duke Energy Indiana's Edwardsport IGCC Project was in service between June 7, 2013 and March 31, 2014 and the Project's current operational performance and cost status and future prospects.

Public Service Commission of West Virginia (Case No. 14-0546-E-PC) – August 2014
The reasonableness of American Electric Power's proposed transfer of 50 percent of the Mitchell Coal Plant to its regulated affiliates in West Virginia.

Mississippi Public Service Commission (Docket No. 2013-UN-189) – March and June 2014
The prudence of Mississippi Power Company's management of the planning for the Kemper County IGCC Plant.

Indiana Utility Regulatory Commission (Cause Nos. 43114 IGCC 8, 10, and 12) – June 2012, April 2013 and April 2014
Startup and pre-operational testing delays at Duke Energy Indiana's Edwardsport IGCC Project.

Public Service Commission of West Virginia (Case No. 12-1655-E-PC) – June 2013 and July 2013
The reasonableness of Appalachian Power Company's proposed acquisition of 2/3 of Unit 3 of the John E. Amos power plant and ½ of the two unit Mitchell power plant.

Public Service Commission of West Virginia (Case No. 12-1571-E-PC) – April 2013
The reasonableness of Monogahela Power Company's proposed acquisition of 80 percent of the Harrison Power Station.

Virginia State Corporation Commission (Case No. PUE-2012-00128) – March 2013
Whether Dominion Virginia Power's proposed Brunswick Project natural gas-fired combined cycle power plant is needed and in the public interest.

Arizona Corporation Commission (Docket No. E-01922A-12-0291 – December 2012
Reasonableness of Tucson Electric Power's proposed Environmental Compliance Adjustor mechanism.

U.S. Nuclear Regulatory Commission (Docket Nos. 50-247-LR and 50-286-LR) – June 2012
Reply to testimony filed by Entergy Nuclear and NRC Staff concerning the relicensing of Indian Point Units 2 and 3.

Mississippi Public Service Commission (Docket No. 2009-UA-014) – March 2012
Petition to Reopen the docket for the Kemper County IGCC Plant based on changed circumstances.

Mississippi Public Service Commission (Docket No. 2009-UA-279) – February 2012
The financial and economic risks of retrofitting Mississippi Power Company's Plant Daniel Coal Plant.

Georgia Public Service Commission (Docket No. 34218) – November 2011
The reasonableness of Georgia Power Company's proposed fossil plant decertification/retirement plan.

Missouri Public Service Commission (Case No. EO-2011-0271) – October 2011
Reasonableness of Ameren Missouri's 2011 Integrated Resource Plan filing.

Maryland Public Service Commission (Case No. 9271) – October 2011
The reasonableness of Constellation Energy Group's proposed divestiture of three coal-fired power plants as mitigation for market power concerns arising from its proposed merger with Exelon Corporation.

Minnesota Public Utilities Commission (Docket No. E017/M-10-1082) – August and September 2011
Whether the proposed addition of the Big Stone Plant Air Quality Control System is a lower cost alternative for the ratepayers of Otter Tail Power Company than retirement of the Plant and replacement by a natural gas-fired combined cycle unit possibly combined with new wind capacity.

Indiana Utility Regulatory Commission (Cause No. 43114 IGCC 4S1) – June, July, and October 2011 and June 2012
Duke Energy Indiana's imprudence and gross mismanagement of Edwardsport IGCC Project.

Kansas State Corporation Commission (Docket No. 11-KCPE-581-PRE) – June 2011
The reasonableness of the proposed environmental upgrades at the La Cygne Generating Station Units 1 and 2.

Arizona Corporation Commission (Docket No. E-01345A-10-0474) – May 2011
The reasonableness of Arizona Public Service Company's proposed acquisition of Southern California Edison's share of Four Corners Units 4 and 5.

Public Utility Commission of Colorado (Docket No. 10M-245E) – September, October and November 2010
The reasonableness of Public Service of Colorado's proposed Emissions Reduction Plan.

Indiana Utility Regulatory Commission (Cause No. 43114 IGCC 4S1) – July, November and December 2010
The reasonableness of Duke Energy Indiana's new analyses of the economics of completing the Edwardsport Project as an IGCC plant.

Oregon Public Utility Commission (Docket LC 48) – May and August 2010
Comments and Reply Comments on Portland General Electric Company's 2009 Integrated Resource Plan.

South Dakota Public Service Commission (Docket No. EL-09-018) – April 2010
The reasonableness of Black Hills Power Company's 2007 Integrated Resource Plan and the Company's decision to build the Wygen III coal-fired power plant.

Michigan Public Service Commission (Docket No. U-16077) – April 2010
Comments on the City of Holland Board of Public Works' 2010 Power Supply Study.

Illinois Commerce Commission (Tenaska Clean Coal Facility Analysis) – April 2010
Comments on the Facility Cost Report for the proposed Taylorville IGCC power plant.

North Carolina Utilities Commission (Docket No. E-100, Sub 124) – February 2010
The reasonableness of the 2009 Integrated Resource Plans of Duke Energy Carolinas and Progress Energy Carolinas.

Mississippi Public Service Commission (Docket No. 2009-UA-014) – December 2009
The costs and risks associated with the proposed Kemper County IGCC power plant.

Public Service Commission of Wisconsin (Docket No. 05-CE-137) –December 2009 and January 2010
The costs and risks associated with the proposed installation of emissions control equipment at the Edgewater Unit 5 coal-fired power plant.

Public Service Commission of Wisconsin (Docket No. 05-CE-138) –September and October 2009
The costs and risks associated with the proposed installation of emissions control equipment at the Columbia 1 and 2 coal-fired power plants.

Public Service Commission of Michigan (Docket No. U-15996) – July 2009
Comments on Consumer Energy's Electric Generation Alernatives Analysis for the Balanced Energy Initiative including the Proposed Karn-Weadock Coal Plant.

Public Service Commission of Michigan (Docket No. U-16000) – Juy 2009
Comments on Wolverine Power Cooperative's Electric Generation Alternatives Analysis for the Proposed Rogers City Coal Plant.

Georgia Public Service Commission (Docket No. 27800-U) – December 2008
The possible costs and risks of proceeding with the proposed Plant Vogtle Units 3 and 4 nuclear power plants.

Public Service Commission of Wisconsin (Docket No. 6680-CE-170) – August and Sepember 2008
The risks associated with the proposed Nelson Dewey 3 baseload coal-fired power plant.

Indiana Utility Regulatory Commission (Cause No. 43114 IGCC 1) – July 2008
The estimated cost of Duke Energy Indiana's Edwardsport Project.

Public Service Commission of Maryland (Case 9127) – July 2008
The estimated cost of the proposed Calvert Cliffs Unit 3 nuclear power plant.

Ohio Power Siting Board (Case No. 06-1358-EL-BGN) – December 2007
AMP-Ohio's application for a Certificate of Environmental Compatibility and Public Need for a 960 MW pulverized coal generating facility.

U.S. Nuclear Regulatory Commission (Docket Nos. 50-247-LR, 50-286-LR) – November 2007 and February 2009
The available options for replacing the power generated at Indian Point Unit 2 and/or Unit 3.

West Virginia Public Service Commission (Case No. 06-0033-E-CN) – November 2007
Appalachian Power Company's application for a Certificate of Public Convenience and Necessity for a 600 MW integrated gasification combined cycle generating facility.

Iowa Utility Board (Docket No. GCU-07-01) – October 2007
Whether Interstate Power & Light Company's adequately considered the risks associated with building a new coal-fired power plant and whether that Company's participation in the proposed Marshalltown plant is prudent.

Virginia State Corporation Commission (Case No. PUE-2007-00066) – November 2007
Whether Dominion Virginia Power's adequately considered the risks associated with building the proposed Wise County coal-fired power plant and whether that Commission should grant a certificate of public convenience and necessity for the plant.

Louisiana Public Service Commission (Docket No. U-30192) – September 2007
The reasonableness of Entergy Louisiana's proposal to repower the Little Gypsy Unit 3 generating facility as a coal-fired power plant.

Arkansas Public Service Commission (Docket No. 06-154-U) – July 2007
The probable economic impact of the Southwestern Electric Power Company's proposed Hempstead coal-fired power plant project.

North Dakota Public Service Commission (Case Nos. PU-06-481 and 482) – May 2007 and April 2008
Whether the participation of Otter Tail Power Company and Montana-Dakota Utilities in the Big Stone II Generating Project is prudent.

Indiana Utility Regulatory Commission (Cause No. 43114) – May 2007
The appropriate carbon dioxide ("CO_2") emissions prices that should be used to analyze the relative economic costs and benefits of Duke Energy Indiana and Vectren Energy Delivery of Indiana's proposed Integrated Gasification Combined Cycle Facility and whether Duke and Vectren have appropriately reflected the capital cost of the proposed facility in their modeling analyses.

Public Service Commission of Wisconsin (Docket No. 6630-EI-113) – May and June 2007
Whether the proposed sale of the Point Beach Nuclear Plant to FPL Energy Point Beach, LLC, is in the interest of the ratepayers of Wisconsin Electric Power Company.

Florida Public Service Commission (Docket No. 070098-EI) – March 2007
Florida Light & Power Company's need for and the economics of the proposed Glades Power Park.

Michigan Public Service Commission (Case No. 14992-U) – December 2006
The reasonableness of the proposed sale of the Palisades Nuclear Power Plant.

Minnesota Public Utilities Commission (Docket No. CN-05-619) – November 2006, December 2007, January 2008 and November 2008
Whether the co-owners of the proposed Big Stone II coal-fired generating plant have appropriately reflected the potential for the regulation of greenhouse gases in their analyses of the facility; and whether the proposed project is a lower cost alternative than renewable options, conservation and load management.

North Carolina Utilities Commission (Docket No. E-7, Sub 790) – September 2006 and January 2007
Duke's need for two new 800 MW coal-fired generating units and the relative economics of adding these facilities as compared to other available options including energy efficiency and renewable technologies.

New Mexico Public Regulatory Commission (Case No. 05-00275-UT) – September 2006
Report to the New Mexico Commission on whether the settlement value of the adjustment for moving the 141 MW Afton combustion turbine merchant plant into rate base is reasonable.

Arizona Corporation Commission (Docket No. E-01345A-0816) – August and September 2006
Whether APS's acquisition of the Sundance Generating Station was prudent and the reasonableness of the amounts that APS requested for fossil plant O&M.

U.S. District Court for the District of Montana (Billings Generation, Inc. vs. Electrical Controls, Inc, et al., CV-04-123-BLG-RFC) – August 2006
Quantification of plaintiff's business losses during an extended power plant outage and plaintiff's business earnings due to the shortening and delay of future plant outages.
[Confidential Expert Report]

Deposition in South Dakota Public Utility Commission Case No. EL05-022 – June 14, 2006

South Dakota Public Utility Commission (Case No. EL05-022) – May and June 2006
Whether the co-owners of the proposed Big Stone II coal-fired generating plant have appropriately reflected the potential for the regulation of greenhouse gases in their analyses of the alternatives to the proposed facility; the need and timing for new supply options in the co-owners' service territories; and whether there are alternatives to the proposed facility that are technically feasible and economically cost-effective.

Georgia Public Service Commission (Docket No. 22449-U) – May 2006
Georgia Power Company's request for an accounting order to record early site permitting and construction operating license costs for new nuclear power plants.

California Public Utilities Commission (Dockets Nos. A.05-11-008 and A.05-11-009) – April 2006
The estimated costs for decommissioning the Diablo Canyon, SONGS 2&3 and Palo Verde nuclear power plants and the annual contributions that are needed from ratepayers to assure that adequate funds will be available to decommission these plants at the projected ends of their service lives.

New Jersey Board of Public Utilities (Docket No. EM05020106) – November and December 2005 and March 2006
Joint Testimony with Bob Fagan and Bruce Biewald on the market power implications of the proposed merger between Exelon Corp. and Public Service Enterprise Group.
Virginia State Corporation Commission (Case No. PUE-2005-00018)– November 2005
The siting of a proposed 230 kV transmission line.

Iowa Utility Board (Docket No. SPU-05-15) – September and October 2005
The reasonableness of IPL's proposed sale of the Duane Arnold Energy Center nuclear plant.

New York State Department of Environmental Conservation (DEC #3-3346-00011/00002) – October 2005
The likely profits that Dynegy will earn from the sale of the energy and capacity of the Danskammer Generating Facility if the plant is converted from once-through to closed-cycle cooling with wet towers or to dry cooling.

Arkansas Public Service Commission (Docket 05-042-U) – July and August 2005
Arkansas Electric Cooperative Corporation's proposed purchase of the Wrightsville Power Facility.

Maine Public Utilities Commission (Docket No. 2005-17) – July 2005
Joint testimony with Peter Lanzalotta and Bob Fagan evaluating Eastern Maine Electric Cooperative's request for a CPCN to purchase 15 MW of transmission capacity from New Brunswick Power.

Federal Energy Regulatory Commission (Docket No. EC05-43-0000) – April and May 2005
Joint Affidavit and Supplemental Affidavit with Bruce Biewald on the market power aspects of the proposed merger of Exelon Corporation and Public Service Enterprise Group, Inc.

Maine Public Utilities Commission (Docket No. 2004-538 Phase II) – April 2005
Joint testimony with Peter Lanzalotta and Bob Fagan evaluating Maine Public Service Company's request for a CPCN to purchase 35 MW of transmission capacity from New Brunswick Power.

Maine Public Utilities Commission (Docket No. 2004-771) – March 2005
Analysis of Bangor Hydro-Electric's Petition for a Certificate of Public Convenience and Necessity to construct a 345 kV transmission line

United States District Court for the Southern District of Ohio, Eastern Division (Consolidated Civil Actions Nos. C2-99-1182 and C2-99-1250)
Whether the public release of company documents more than three years old would cause competitive harm to the American Electric Power Company. [Confidential Expert Report]

New Jersey Board of Public Utilities (Docket No. EO03121014) – February 2005
Whether the Board of Public Utilities can halt further collections from Jersey Central Power & Light Company's ratepayers because there already are adequate funds in the company's decommissioning trusts for the Three Mile Island Unit No. 2 Nuclear Plant to allow for the decommissioning of that unit without endangered the public health and safety.

Maine Public Utilities Commission (Docket No. 2004-538) – January and March 2005
Analysis of Maine Public Service Company's request to construct a 138 kV transmission line from Limestone, Maine to the Canadian Border.

California Public Utilities Commission (Application No. AO4-02-026) – December 2004 and January 2005
Southern California Edison's proposed replacement of the steam generators at the San Onofre Unit 2 and Unit 3 nuclear power plants and whether the utility was imprudent for failing to initiate litigation against Combustion Engineering due to defects in the design of and materials used in those steam generators.

United States District Court for the Southern District of Indiana, Indianapolis Division (Civil Action No. IP99-1693) – December 2004
Whether the public release of company documents more than three years old would cause competitive harm to the Cinergy Corporation. [Confidential Expert Report]

California Public Utilities Commission (Application No. AO4-01-009) – August 2004
Pacific Gas & Electric's proposed replacement of the steam generators at the Diablo Canyon nuclear power plant and whether the utility was imprudent for failing to initiate litigation against Westinghouse due to defects in the design of and materials used in those steam generators.

Public Service Commission of Wisconsin (Docket No. 6690-CE-187) – June, July and August 2004
Whether Wisconsin Public Service Corporation's request for approval to build a proposed 515 MW coal-burning generating facility should be granted.

Public Service Commission of Wisconsin (Docket No. 05-EI-136) – May and June 2004
Whether the proposed sale of the Kewaunee Nuclear Power Plant to a subsidiary of an out-of-state holding company is in the public interest.

Connecticut Siting Council (Docket No. 272) – May 2004
Whether there are technically viable alternatives to the proposed 345-kV transmission line between Middletown and Norwalk Connecticut and the length of the line that can be installed underground.

Arizona Corporation Commission (Docket No. E-01345A-03-0437 – February 2004
Whether Arizona Public Service Company should be allowed to acquire and include in rate base five generating units that were built by a deregulated affiliate.

State of Rhode Island Energy Facilities Siting Board (Docket No. SB-2003-1) – February 2004
Whether the cost of undergrounding a relocated 115kV transmission line would be eligible for regional cost socialization.

State of Maine Department of Environmental Protection (Docket No. A-82-75-0-X) – December 2003
The storage of irradiated nuclear fuel in an Independent Spent Fuel Storage Installation (ISFSI) and whether such an installation represents an air pollution control facility.

Rhode Island Public Utility Commission (Docket No. 3564) – December 2003 and January 2004
Whether Narragansett Electric Company should be required to install a relocated 115kV transmission line underground.

New York State Board on Electric Generation Siting and the Environment (Case No. 01-F-1276) – September, October and November 2003
The environmental, economic and system reliability benefits that can reasonably be expected from the proposed 1,100 MW TransGas Energy generating facility in Brooklyn, New York.

Wisconsin Public Service Commission (Case 6690-UR-115) - September and October 2003
The reasonableness of Wisconsin Public Service Corporation's decommissioning cost collections for the Kewaunee Nuclear Plant.

Oklahoma Corporation Commission (Cause No. 2003-121) – July 2003
Whether Empire District Electric Company properly reduced its capital costs to reflect the write-off of a portion of the cost of building a new electric generating facility.

Arkansas Public Service Commission (Docket 02-248-U) – May 2003
Entergy's proposed replacement of the steam generators and the reactor vessel head at the ANO Unit 1 Steam Generating Station.

Appellate Tax Board, State of Massachusetts (Docket No C258405-406) – May 2003
The physical nature of electricity and whether electricity is a tangible product or a service.

Maine Public Utilities Commission (Docket 2002-665-U) – April 2003
Analysis of Central Maine Power Company's proposed transmission line for Southern York County and recommendation of alternatives.

Massachusetts Legislature, Joint Committees on Government Regulations and Energy – March 2003
Whether PG&E can decide to permanently retire one or more of the generating units at its Salem Harbor Station if it is not granted an extension beyond October 2004 to reduce the emissions from the Station's three coal-fired units and one oil-fired unit.

New Jersey Board of Public Utilities (Docket No. ER02080614) – January 2003
The prudence of Rockland Electric Company's power purchases during the period August 1, 1999 through July 31, 2002.

New York State Board on Electric Generation Siting and the Environment (Case No. 00-F-1356) – September and October 2002 and January 2003
The need for and the environmental benefits from the proposed 300 MW Kings Park Energy generating facility.

Arizona Corporation Commission (Docket No. E-01345A-01-0822) – May 2002
The reasonableness of Arizona Public Service Company's proposed long-term power purchase agreement with an affiliated company.

New York State Board on Electric Generation Siting and the Environment (Case No. 99-F-1627) – March 2002
Repowering NYPA's existing Poletti Station in Queens, New York.

Connecticut Siting Council (Docket No. 217) – March 2002, November 2002, and January 2003
Whether the proposed 345-kV transmission line between Plumtree and Norwalk substations in Southwestern Connecticut is needed and will produce public benefits.

Vermont Public Service Board (Case No. 6545) – January 2002
Whether the proposed sale of the Vermont Yankee Nuclear Plant to Entergy is in the public interest of the State of Vermont and Vermont ratepayers.

Connecticut Department of Public Utility Control (Docket 99-09-12RE02) – December 2001
The reasonableness of adjustments that Connecticut Light and Power Company seeks to make to the proceeds that it received from the sale of Millstone Nuclear Power Station.

Connecticut Siting Council (Docket No. 208) – October 2001
Whether the proposed cross-sound cable between Connecticut and Long Island is needed and will produce public benefits for Connecticut consumers.

New Jersey Board of Public Utilities (Docket No. EM01050308) - September 2001
The market power implications of the proposed merger between Conectiv and Pepco.

Illinois Commerce Commission Docket No. 01-0423 – August, September, and October 2001
Commonwealth Edison Company's management of its distribution and transmission systems.

New York State Board on Electric Generation Siting and the Environment (Case No. 99-F-1627) - August and September 2001
The environmental benefits from the proposed 500 MW NYPA Astoria generating facility.

New York State Board on Electric Generation Siting and the Environment (Case No. 99-F-1191) - June 2001
The environmental benefits from the proposed 1,000 MW Astoria Energy generating facility.

New Jersey Board of Public Utilities (Docket No. EM00110870) - May 2001
The market power implications of the proposed merger between FirstEnergy and GPU Energy.

Connecticut Department of Public Utility Control (Docket 99-09-12RE01) - November 2000
The proposed sale of Millstone Nuclear Station to Dominion Nuclear, Inc.

Illinois Commerce Commission (Docket 00-0361) - August 2000
The impact of nuclear power plant life extensions on Commonwealth Edison Company's decommissioning costs and collections from ratepayers.

Vermont Public Service Board (Docket 6300) - April 2000
Whether the proposed sale of the Vermont Yankee nuclear plant to AmerGen Vermont is in the public interest.

Massachusetts Department of Telecommunications and Energy (Docket 99-107, Phase II) - April and June 2000
The causes of the May 18, 1999, main transformer fire at the Pilgrim generating station.

Connecticut Department of Public Utility Control (Docket 00-01-11) - March and April 2000
The impact of the proposed merger between Northeast Utilities and Con Edison, Inc. on the reliability of the electric service being provided to Connecticut ratepayers.

Connecticut Department of Public Utility Control (Docket 99-09-12) - January 2000
The reasonableness of Northeast Utilities plan for auctioning the Millstone Nuclear Station.

Connecticut Department of Public Utility Control (Docket 99-08-01) - November 1999
Generation, Transmission, and Distribution system reliability.

Illinois Commerce Commission (Docket 99-0115) - September 1999
Commonwealth Edison Company's decommissioning cost estimate for the Zion Nuclear Station.

Connecticut Department of Public Utility Control (Docket 99-03-36) - July 1999
Standard offer rates for Connecticut Light & Power Company.

Connecticut Department of Public Utility Control (Docket 99-03-35) - July 1999
Standard offer rates for United Illuminating Company.
Connecticut Department of Public Utility Control (Docket 99-02-05) - April 1999
Connecticut Light & Power Company stranded costs.

Connecticut Department of Public Utility Control (Docket 99-03-04) - April 1999
United Illuminating Company stranded costs.

Maryland Public Service Commission (Docket 8795) - December 1998
Future operating performance of Delmarva Power Company's nuclear units.

Maryland Public Service Commission (Dockets 8794/8804) - December 1998
Baltimore Gas and Electric Company's proposed replacement of the steam generators at the Calvert Cliffs Nuclear Power Plant. Future performance of nuclear units.

Indiana Utility Regulatory Commission (Docket 38702-FAC-40-S1) - November 1998
Whether the ongoing outages of the two units at the D.C. Cook Nuclear Plant were caused or extended by mismanagement.

Arkansas Public Service Commission (Docket 98-065-U) - October 1998
Entergy's proposed replacement of the steam generators at the ANO Unit 2 Steam Generating Station.

Massachusetts Department of Telecommunications and Energy (Docket 97-120) - October 1998
Western Massachusetts Electric Company's Transition Charge. Whether the extended 1996-1998 outages of the three units at the Millstone Nuclear Station were caused or extended by mismanagement.

Connecticut Department of Public Utility Control (Docket 98-01-02) - September 1998
Nuclear plant operations, operating and capital costs, and system reliability improvement costs.

Illinois Commerce Commission (Docket 97-0015) - May 1998
Whether any of the outages of Commonwealth Edison Company's twelve nuclear units during 1996 were caused or extended by mismanagement. Whether equipment problems, personnel performance weaknesses, and program deficiencies could have been avoided or addressed prior to plant outages. Outage-related fuel and replacement power costs.

Public Service Commission of West Virginia (Case 97-1329-E-CN) - March 1998
The need for a proposed 765 kV transmission line from Wyoming, West Virginia, to Cloverdate, Virginia.

Illinois Commerce Commission (Docket 97-0018) - March 1998
Whether any of the outages of the Clinton Power Station during 1996 were caused or extended by mismanagement.

Connecticut Department of Public Utility Control (Docket 97-05-12) - October 1997
The increased costs resulting from the ongoing outages of the three units at the Millstone Nuclear Station.

New Jersey Board of Public Utilities (Docket ER96030257) - August 1996
Replacement power costs during plant outages.

Illinois Commerce Commission (Docket 95-0119) - February 1996
Whether any of the outages of Commonwealth Edison Company's twelve nuclear units during 1994 were caused or extended by mismanagement. Whether equipment problems, personnel performance weaknesses, and program deficiencies could have been avoided or addressed prior to plant outages. Outage-related fuel and replacement power costs.

Public Utility Commission of Texas (Docket 13170) - December 1994
Whether any of the outages of the River Bend Nuclear Station during the period October 1, 1991, through December 31, 1993, were caused or extended by mismanagement.

Public Utility Commission of Texas (Docket 12820) - October 1994
Operations and maintenance expenses during outages of the South Texas Nuclear Generating Station.

Wisconsin Public Service Commission (Cases 6630-CE-197 and 6630-CE-209) - September and October 1994
The reasonableness of the projected cost and schedule for the replacement of the steam generators at the Point Beach Nuclear Power Plant. The potential impact of plant aging on future operating costs and performance.

Public Utility Commission of Texas (Docket 12700) - June 1994
Whether El Paso Electric Company's share of Palo Verde Unit 3 was needed to ensure adequate levels of system reliability. Whether the Company's investment in Unit 3 could be expected to generate cost savings for ratepayers within a reasonable number of years.

Arizona Corporation Commission (Docket U-1551-93-272) - May and June 1994
Southwest Gas Corporation's plastic and steel pipe repair and replacement programs.

Connecticut Department of Public Utility Control (Docket 92-04-15) - March 1994
Northeast Utilities management of the 1992/1993 replacement of the steam generators at Millstone Unit 2.

Connecticut Department of Public Utility Control (Docket 92-10-03) - August 1993
Whether the 1991 outage of Millstone Unit 3 as a result of the corrosion of safety-related plant piping systems was due to mismanagement.

Public Utility Commission of Texas (Docket 11735) - April and July 1993
Whether any of the outages of the Comanche Peak Unit 1 Nuclear Station during the period August 13, 1990, through June 30, 1992, were caused or extended by mismanagement.

Connecticut Department of Public Utility Control (Docket 91-12-07) - January 1993 and August 1995
Whether the November 6, 1991, pipe rupture at Millstone Unit 2 and the related outages of the Connecticut Yankee and Millstone units were caused or extended by mismanagement. The impact of environmental requirements on power plant design and operation.

Connecticut Department of Public Utility Control (Docket 92-06-05) - September 1992
United Illuminating Company off-system capacity sales. [Confidential Testimony]

Public Utility Commission of Texas (Docket 10894) - August 1992
Whether any of the outages of the River Bend Nuclear Station during the period October 1, 1988, through September 30, 1991, were caused or extended by mismanagement.

Connecticut Department of Public Utility Control (Docket 92-01-05) - August 1992
Whether the July 1991 outage of Millstone Unit 3 due to the fouling of important plant systems by blue mussels was the result of mismanagement.

California Public Utilities Commission (Docket 90-12-018) - November 1991, April 1992, June and July 1993
Whether any of the outages of the three units at the Palo Verde Nuclear Generating Station during 1989 and 1990 were caused or extended by mismanagement. Whether equipment problems, personnel performance weaknesses and program deficiencies could have been avoided or addressed prior to outages. Whether specific plant operating cost and capital expenditures were necessary and prudent.

Public Utility Commission of Texas (Docket 9945) - June 1991
Whether El Paso Electric Company's share of Palo Verde Unit 3 was needed to ensure adequate levels of system reliability. Whether the Company's investment in the unit could be expected to generate cost savings for ratepayers within a reasonable number of years. El Paso Electric Company's management of the planning and licensing of the Arizona Interconnection Project transmission line.

Arizona Corporation Commission (Docket U-1345-90-007) - December 1990 and April 1991
Arizona Public Service Company's management of the planning, construction and operation of the Palo Verde Nuclear Generating Station. The costs resulting from identified instances of mismanagement.

New Jersey Board of Public Utilities (Docket ER89110912J) - July and October 1990
The economic costs and benefits of the early retirement of the Oyster Creek Nuclear Plant. The potential impact of the unit's early retirement on system reliability. The cost and schedule for siting and constructing a replacement natural gas-fired generating plant.

Public Utility Commission of Texas (Docket 9300) - June and July 1990
Texas Utilities management of the design and construction of the Comanche Peak Nuclear Plant. Whether the Company was prudent in repurchasing minority owners' shares of Comanche Peak without examining the costs and benefits of the repurchase for its ratepayers.
Federal Energy Regulatory Commission (Docket EL-88-5-000) - November 1989
Boston Edison's corporate management of the Pilgrim Nuclear Station.

Connecticut Department of Public Utility Control (Docket 89-08-11) - November 1989
United Illuminating Company's off-system capacity sales.

Kansas State Corporation Commission (Case 164,211-U) - April 1989
Whether any of the 127 days of outages of the Wolf Creek generating plant during 1987 and 1988 were the result of mismanagement.

Public Utility Commission of Texas (Docket 8425) - March 1989
Whether Houston Lighting & Power Company's new Limestone Unit 2 generating facility was needed to provide adequate levels of system reliability. Whether the Company's investment in Limestone Unit 2 would provide a net economic benefit for ratepayers.

Illinois Commerce Commission (Dockets 83-0537 and 84-0555) - July 1985 and January 1989
Commonwealth Edison Company's management of quality assurance and quality control activities and the actions of project contractors during construction of the Byron Nuclear Station.

New Mexico Public Service Commission (Case 2146, Part II) - October 1988
The rate consequences of Public Service Company of New Mexico's ownership of Palo Verde Units 1 and 2.

United States District Court for the Eastern District of New York (Case 87-646-JBW) - October 1988
Whether the Long Island Lighting Company withheld important information from the New York State Public Service Commission, the New York State Board on Electric Generating Siting and the Environment, and the U.S. Nuclear Regulatory Commission.

Public Utility Commission of Texas (Docket 6668) - August 1988 and June 1989
Houston Light & Power Company's management of the design and construction of the South Texas Nuclear Project. The impact of safety-related and environmental requirements on plant construction costs and schedule.

Federal Energy Regulatory Commission (Docket ER88-202-000) - June 1988
Whether the turbine generator vibration problems that extended the 1987 outage of the Maine Yankee nuclear plant were caused by mismanagement.

Illinois Commerce Commission (Docket 87-0695) - April 1988
Illinois Power Company's planning for the Clinton Nuclear Station.

North Carolina Utilities Commission (Docket E-2, Sub 537) - February 1988
Carolina Power & Light Company's management of the design and construction of the Harris Nuclear Project. The Company's management of quality assurance and quality control activities. The impact of safety-related and environmental requirements on construction costs and schedule. The cost and schedule consequences of identified instances of mismanagement.

Ohio Public Utilities Commission (Case 87-689-EL-AIR) - October 1987
Whether any of Ohio Edison's share of the Perry Unit 2 generating facility was needed to ensure adequate levels of system reliability. Whether the Company's investment in Perry Unit 1 would produce a net economic benefit for ratepayers.

North Carolina Utilities Commission (Docket E-2, Sub 526) - May 1987
Fuel factor calculations.

New York State Public Service Commission (Case 29484) - May 1987
The planned startup and power ascension testing program for the Nine Mile Point Unit 2 generating facility.

Illinois Commerce Commission (Dockets 86-0043 and 86-0096) - April 1987
The reasonableness of certain terms in a proposed Power Supply Agreement.

Illinois Commerce Commission (Docket 86-0405) - March 1987
The in-service criteria to be used to determine when a new generating facility was capable of providing safe, adequate, reliable and efficient service.

Indiana Public Service Commission (Case 38045) - November 1986
Northern Indiana Public Service Company's planning for the Schaefer Unit 18 generating facility. Whether the capacity from Unit 18 was needed to ensure adequate system reliability. The rate consequences of excess capacity on the Company's system.

Superior Court in Rockingham County, New Hampshire (Case 86E328) - July 1986
The radiation effects of low power testing on the structures, equipment and components in a new nuclear power plant.

New York State Public Service Commission (Case 28124) - April 1986 and June 1987
The terms and provisions in a utility's contract with an equipment supplier. The prudence of the utility's planning for a new generating facility. Expenditures on a canceled generating facility.

Arizona Corporation Commission (Docket U-1345-85) - February 1986
The construction schedule for Palo Verde Unit No. 1. Regulatory and technical factors that would likely affect future plant operating costs.

New York State Public Service Commission (Case 29124) – December 1985 and January 1986
Niagara Mohawk Power Corporation's management of construction of the Nine Mile Point Unit No. 2 nuclear power plant.

New York State Public Service Commission (Case 28252) - October 1985
A performance standard for the Shoreham nuclear power plant.

New York State Public Service Commission (Case 29069) - August 1985
A performance standard for the Nine Mile Point Unit No. 2 nuclear power plant.

Missouri Public Service Commission (Cases ER-85-128 and EO-85-185) - July 1985
The impact of safety-related regulatory requirements and plant aging on power plant operating costs and performance. Regulatory factors and plant-specific design features that will likely affect the future operating costs and performance of the Wolf Creek Nuclear Plant.

Massachusetts Department of Public Utilities (Case 84-152) - January 1985
The impact of safety-related regulatory requirements and plant aging on power plant operating costs and performance. Regulatory factors and plant-specific design features that will likely affect the future operating costs and performance of the Seabrook Nuclear Plant.

Maine Public Utilities Commission (Docket 84-113) - September 1984
The impact of safety-related regulatory requirements and plant aging on power plant operating costs and performance. Regulatory factors and plant-specific design features that will likely affect the future operating costs and performance of the Seabrook Nuclear Plant.

South Carolina Public Service Commission (Case 84-122-E) - August 1984
The repair and replacement strategy adopted by Carolina Power & Light Company in response to pipe cracking at the Brunswick Nuclear Station. Quantification of replacement power costs attributable to identified instances of mismanagement.

Vermont Public Service Board (Case 4865) - May 1984
The repair and replacement strategy adopted by management in response to pipe cracking at the Vermont Yankee nuclear plant.

New York State Public Service Commission (Case 28347) -January 1984
The information that was available to Niagara Mohawk Power Corporation prior to 1982 concerning the potential for cracking in safety-related piping systems at the Nine Mile Point Unit No. 1 nuclear plant.

New York State Public Service Commission (Case 28166) - January 1983 and February 1984
Whether the January 25, 1982, steam generator tube rupture at the Ginna Nuclear Plant was caused by mismanagement.

U.S. Nuclear Regulatory Commission (Case 50-247SP) - May 1983
The economic costs and benefits of the early retirement of the Indian Point nuclear plants.

REPORTS, ARTICLES, AND PRESENTATIONS

How the High Cost of Power from Prairie State is Affecting Bowling Green Municipal Utilities' Customers. July, 2014.

Overpriced Power: Why Batavia is Paying So Much for Electricity. Updated March 2014.

Huntley Generating Station: Coal Plant's Weak Financial Outlook Calls for Corporate & Community Leadership. January 2014. Co-authored with Cathy Kunkel and Tom Sanzillo.

When, Not If: Bridgeport's Future and the Closing of PSEG's Coal Plant.

Changing Course: A Clean Energy Investment Plan for Dominion Virginia Power. Co-authored with Jeff Loiter and Anna Sommer. August 2013.

Mountain State Maneuver: AEP and FirstEnergy try to stick ratepayers with Risky Coal Plants. September 2013. Co-authored with Cathy Kunkel.

Public Utility Regulation without the Public: The Alabama Public Service Commission and Alabama Power. Co-authored with Anna Sommer. March 2013

A Texas Electric Capacity Market: The Wrong Tool for a Real Problem. Co-authored with Anna Sommer. February 2013.

Dark Days Ahead: Financial Factors Cloud Future Profitability at Dominion's Brayton Point Power Plant. Co-authored with Tom Sanzillo. February 2013.

Report on the Kemper IGCC Project: Cost and Schedule Risks. November 2012.

The Prairie State Coal Plant: the Reality vs. the Promise. August 2012.

The Impact of EPA's Proposed 316(b) Existing Facility Rule on Electric System Reliability, July 2011.

The Economics of Existing Coal-Fired Power Plants, Presentation at EUCI Conference in St. Louis, MO, November 2010.

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Phasing Out Federal Subsidies for Coal, April 2010.

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The Economic Impact of Restricting Mountaintop/Valley Fill Coal Mining in Central Appalachia, August 2009.

Energy Future: A Green Energy Alternative for Michigan, report, July 2009.

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Preliminary Assessment of East Kentucky Power Cooperative's 2009 Resource Plan, June 2009.

The Financial Risks to Old Dominion Electric Cooperative's Consumer-Members of Building and Operating the Proposed Cypress Creek Power Station, April 2009.

An Assessment of Santee Cooper's 2008 Resource Planning, April 2009.

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New Hampshire Senate Bill 152: Merrimack Station Scrubber, March 2009.

The Risks of Building and Operating Plant Washington, Presentation to the Sustainable Atlanta Roundtable, December 2008.

The Risks of Building and Operating Plant Washington, Report and Presentation to EMC Board Members, December 2008.

Don't Get Burned, the Risks of Investing in New Coal-Fired Power Plants, Presentation at the University of California at Berkeley Energy and Resources Group Colloquium, October 2008.

Don't Get Burned, the Risks of Investing in New Coal-Fired Power Plants, Presentation at Georgia Tech University, October 2008.

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*Don't Get Burned,*Report for the Interfaith Center for Corporate Responsibility, February 2008.

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The Risks of Building New Nuclear Power Plants, Presentation to the Utah State Legislature Public Utilities and Technology Committee, September 19, 2007.

The Risks of Building New Nuclear Power Plants, Presentation to Moody's and Standard & Poor's rating agencies, May 17, 2007.

The Risks of Building New Nuclear Power Plants, U.S. Senate and House of Representative Briefings, April 20, 2007.

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The Risks of Building New Nuclear Power Plants, Presentation to the New York Society of Securities Analysts, June 8, 2006.

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Comments on natural gas utilities' Phase I Proposals for pre-approved full cost recovery of contracts with liquid natural gas (LNG) suppliers and the costs of interconnecting their systems with LNG facilities. Comments in California Public Utilities Commission Rulemaking 04-01-025. March 23, 2004.

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The Impact of Converting the Cooling Systems at Indian Point Units 2 and 3 on Electric System Reliability. An Analysis for Riverkeeper, Inc. November 3, 2003.

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Power Plant Repowering as a Strategy for Reducing Water Consumption at Existing Electric Generating Facilities. A presentation at the May 2003 Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms. May 6, 2003.

Financial Insecurity: The Increasing Use of Limited Liability Companies and Multi-tiered Holding Companies to Own Electric Generating Plants. A presentation at the 2002 NASUCA Annual Meeting. November 12, 2002.

Determining the Need for Proposed Overhead Transmission Facilities. A Presentation by David Schlissel and Paul Peterson to the Task Force and Working Group for Connecticut Public Act 02-95. October 17, 2002.

Future PG&E Net Revenues From The Sale of Electricity Generated at its Brayton Point Station. An Analysis for the Attorney General of the State of Rhode Island. October 2, 2002.

PG&E's Net Revenues From The Sale of Electricity Generated at its Brayton Point Station During the Years 1999-2002. An Analysis for the Attorney General of the State of Rhode Island. October 2, 2002.

Financial Insecurity: The Increasing Use of Limited Liability Companies and Multi-Tiered Holding Companies to Own Nuclear Power Plants. A Synapse report for the STAR Foundation and Riverkeeper, Inc., by David Schlissel, Paul Peterson, and Bruce Biewald, August 7, 2002.

Comments on EPA's Proposed Clean Water Act Section 316(b) for Cooling Water Intake Structures at Phase II Existing Facilities, on behalf of Riverkeeper, Inc., by David Schlissel and Geoffrey Keith, August 2002.

The Impact of Retiring the Indian Point Nuclear Power Station on Electric System Reliability. A Synapse Report for Riverkeeper, Inc. and Pace Law School Energy Project. May 7, 2002.

Preliminary Assessment of the Need for the Proposed Plumtree-Norwalk 345-kV Transmission Line. A Synapse Report for the Towns of Bethel, Redding, Weston, and Wilton Connecticut. October 15, 2001.

ISO New England's Generating Unit Availability Study: Where's the Beef? A Presentation at the June 29, 2001 Restructuring Roundtable.

Clean Air and Reliable Power: Connecticut Legislative House Bill HB6365 will not Jeopardize Electric System Reliability. A Synapse Report for the Clean Air Task Force. May 2001.

Room to Breathe: Why the Massachusetts Department of Environmental Protection's Proposed Air Regulations are Compatible with Reliability. A Synapse Report for MASSPIRG and the Clean Water Fund. March 2001.

Generator Outage Increases: A Preliminary Analysis of Outage Trends in the New England Electricity Market, a Synapse Report for the Union of Concerned Scientists, January 7, 2001.

Cost, Grid Reliability Concerns on the Rise Amid Restructuring, with Charlie Harak, Boston Business Journal, August 18-24, 2000.

Report on Indian Point 2 Steam Generator Issues, Schlissel Technical Consulting, Inc., March 10, 2000.

Preliminary Expert Report in Case 96-016613, <u>Cities of Wharton, Pasadena, et al v. Houston Lighting & Power Company</u>, October 28, 1999.

Comments of Schlissel Technical Consulting, Inc. on the Nuclear Regulatory Commission's Draft Policy Statement on Electric Industry Economic Deregulation, February 1997.

Report to the Municipal Electric Utility Association of New York State on the Cost of Decommissioning the Fitzpatrick Nuclear Plant, August 1996.

Report to the Staff of the Arizona Corporation Commission on U.S. West Corporation's telephone cable repair and replacement programs, May, 1996.

Nuclear Power in the Competitive Environment, NRRI Quarterly Bulletin, Vol. 16, No. 3, Fall 1995.

Nuclear Power in the Competitive Environment, presentation at the 18th National Conference of Regulatory Attorneys, Scottsdale, Arizona, May 17, 1995.

The Potential Safety Consequences of Steam Generator Tube Cracking at the Byron and Braidwood Nuclear Stations, a report for the Environmental Law and Policy Center of the Midwest, 1995.

Report to the Public Policy Group Concerning Future Trojan Nuclear Plant Operating Performance and Costs, July 15, 1992.

Report to the New York State Consumer Protection Board on the Costs of the 1991 Refueling Outage of Indian Point 2, December 1991.

Preliminary Report on Excess Capacity Issues to the Public Utility Regulation Board of the City of El Paso, Texas, April 1991.

Nuclear Power Plant Construction Costs, presentation at the November, 1987, Conference of the National Association of State Utility Consumer Advocates.

Comments on the Final Report of the National Electric Reliability Study, a report for the New York State Consumer Protection Board, February 27, 1981.

OTHER SIGNIFICANT INVESTIGATIONS AND LITIGATION SUPPORT WORK

Reviewed the salt deposition mitigation strategy proposed for Reliant Energy's repowering of its Astoria Generating Station. October 2002 through February 2003.

Assisted the Connecticut Office of Consumer Counsel in reviewing the auction of Connecticut Light & Power Company's power purchase agreements. August and September, 2000.

Assisted the New Jersey Division of the Ratepayer Advocate in evaluating the reasonableness of Atlantic City Electric Company's proposed sale of its fossil generating facilities. June and July, 2000.

Investigated whether the 1996-1998 outages of the three Millstone Nuclear Units were caused or extended by mismanagement. 1997 and 1998. Clients were the Connecticut Office of Consumer Counsel and the Office of the Attorney General of the Commonwealth of Massachusetts.

Investigated whether the 1995-1997 outages of the two units at the Salem Nuclear Station were caused or extended by mismanagement. 1996-1997. Client was the New Jersey Division of the Ratepayer Advocate.

Assisted the Associated Industries of Massachusetts in quantifying the stranded costs associated with utility generating plants in the New England states. May through July, 1996

Investigated whether the December 25, 1993, turbine generator failure and fire at the Fermi 2 generating plant was caused by Detroit Edison Company's mismanagement of fabrication, operation or maintenance. 1995. Client was the Attorney General of the State of Michigan.

Investigated whether the outages of the two units at the South Texas Nuclear Generating Station during the years 1990 through 1994 were caused or extended by mismanagement. Client was the Texas Office of Public Utility Counsel.

Assisted the City Public Service Board of San Antonio, Texas in litigation over Houston Lighting & Power Company's management of operations of the South Texas Nuclear Generating Station.

Investigated whether outages of the Millstone nuclear units during the years 1991 through 1994 were caused or extended by mismanagement. Client was the Office of the Attorney General of the Commonwealth of Massachusetts.

Evaluated the 1994 Decommissioning Cost Estimate for the Maine Yankee Nuclear Plant. Client was the Public Advocate of the State of Maine.

Evaluated the 1994 Decommissioning Cost Estimate for the Seabrook Nuclear Plant. Clients were investment firms that were evaluating whether to purchase the Great Bay Power Company, one of Seabrook's minority owners.

Investigated whether a proposed natural-gas fired generating facility was need to ensure adequate levels of system reliability. Examined the potential impacts of environmental regulations on the unit's expected construction cost and schedule. 1992. Client was the New Jersey Rate Counsel.

Investigated whether Public Service Company of New Mexico management had adequately disclosed to potential investors the risk that it would be unable to market its excess generating capacity. Clients were individual shareholders of Public Service Company of New Mexico.

Investigated whether the Seabrook Nuclear Plant was prudently designed and constructed. 1989. Clients were the Connecticut Office of Consumer Counsel and the Attorney General of the State of Connecticut.

Investigated whether Carolina Power & Light Company had prudently managed the design and construction of the Harris nuclear plant. 1988-1989. Clients were the North Carolina Electric Municipal Power Agency and the City of Fayetteville, North Carolina.

Investigated whether the Grand Gulf nuclear plant had been prudently designed and constructed. 1988. Client was the Arkansas Public Service Commission.

Reviewed the financial incentive program proposed by the New York State Public Service Commission to improve nuclear power plant safety. 1987. Client was the New York State Consumer Protection Board.

Reviewed the construction cost and schedule of the Hope Creek Nuclear Generating Station. 1986-1987. Client was the New Jersey Rate Counsel.

Reviewed the operating performance of the Fort St. Vrain Nuclear Plant. 1985. Client was the Colorado Office of Consumer Counsel.

WORK HISTORY

2012- Director of Resource Planning Analysis, Institute for Energy Economics and Financial Analysis

2010 - President, Schlissel Technical Consulting, Inc.

2000 - 2009: Senior Consultant, Synapse Energy Economics, Inc.

1994 - 2000: President, Schlissel Technical Consulting, Inc.

1983 - 1994: Director, Schlissel Engineering Associates

1979 - 1983: Private Legal and Consulting Practice

1975 - 1979: Attorney, New York State Consumer Protection Board

1973 - 1975: Staff Attorney, Georgia Power Project

EDUCATION

1983-1985: Massachusetts Institute of Technology
Special Graduate Student in Nuclear Engineering and Project Management,

1973: Stanford Law School,
Juris Doctor

1969: Stanford University
Master of Science in Astronautical Engineering,

1968: Massachusetts Institute of Technology
Bachelor of Science in Astronautical Engineering,

PROFESSIONAL MEMBERSHIPS

- New York State Bar since 1981

Direct Testimony and Exhibits of

David A. Schlissel

on behalf of MEIC and Sierra Club

Exhibit DAS-2

RESIDENTIAL ELECTRICITY RATES OF NORTHWESTERN ENERGY THROUGH JUNE 2017

Prepared By:
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Montana Consumer Counsel
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Introduction

The following graphs show residential electricity rates, sources of electricity, and selected unit prices of NorthWestern Energy ("NorthWestern"). This information is available in published tariffs and various dockets at the Montana Public Service Commission.

Since 1998, consumers of electricity services from NorthWestern or its predecessor have paid three primary electricity rates: (1) a Distribution Delivery Service Rate ("**Distribution**"); (2) a Transmission Delivery Service Rate ("**Transmission**"); and (3) electricity supply rates. The Transmission and Distribution rates pay for the wires and poles that transmit electricity. The supply rates pay for the electricity itself. These volumetric rates are charged in addition to a flat customer charge, currently $4.10 per month.

NorthWestern has purchased significant quantities of electricity from PPL Montana, now Talen Energy ("**PPL**"), as well as a 135-megawatt ("MW") wind farm in Wheatland County ("**Judith Gap**"). NorthWestern makes daily market purchases and sales through the Mid-Columbia trading hub and reports the sum of these offsetting transactions ("**Spot Market**"). It also has numerous contracts with Qualifying Facilities, whose thermal and renewable power it is required to purchase at rates not exceeding its "avoided cost."[1] These include contracts signed by NorthWestern since 2006 ("**QF-1**") and the Montana Power Company prior to 1996 ("**QF II**").[2]

[1] *See* 18 C.F.R. § 292.303 (2017).
[2] NorthWestern also collects QF II costs a separate QF-CTC rate, which is included on the graphs.

In recent years, NorthWestern has acquired its own power plants to generate an increasing share of its electricity. In 2009, it rate-based its 222-MW share of the Colstrip Generating Station in Rosebud County ("**Colstrip**"). In 2011, it commissioned a 150-MW natural gas plant in Deer Lodge County to provide grid regulation and wind integration services ("**Dave Gates**"). In 2012, it acquired a 40-MW wind farm in Judith Basin County ("**Spion Kop**"). In November 2014, it purchased a number of large hydroelectric facilities from PPL, which currently provide about 440 MW of power ("**Hydros**").

In 1997, the Montana Legislature mandated a "Universal System Benefits" charge, which annually collects 2.4% of NorthWestern's 1995 retail sales revenue to ensure continued funding of low-income, conservation and renewable energy programs ("**USB**"). Since 2004, NorthWestern has also administered "demand-side management" programs to promote cost-effective conservation and efficiency efforts ("**DSM**"). By reducing the amount of electricity sold, these efforts may reduce certain revenues, which NorthWestern was allowed to calculate and collect from 2006 through 2015 ("**Lost Revenues**").

The Bonneville Power Administration shares the benefits of low-cost federal hydropower with NorthWestern's ratepayers through a residential credit mandated by Congress ("**BPA Credit**").[3] NorthWestern's supply rates also include administrative, transmission and carrying costs, as well as other purchases, adjustments and charges ("**Other**").

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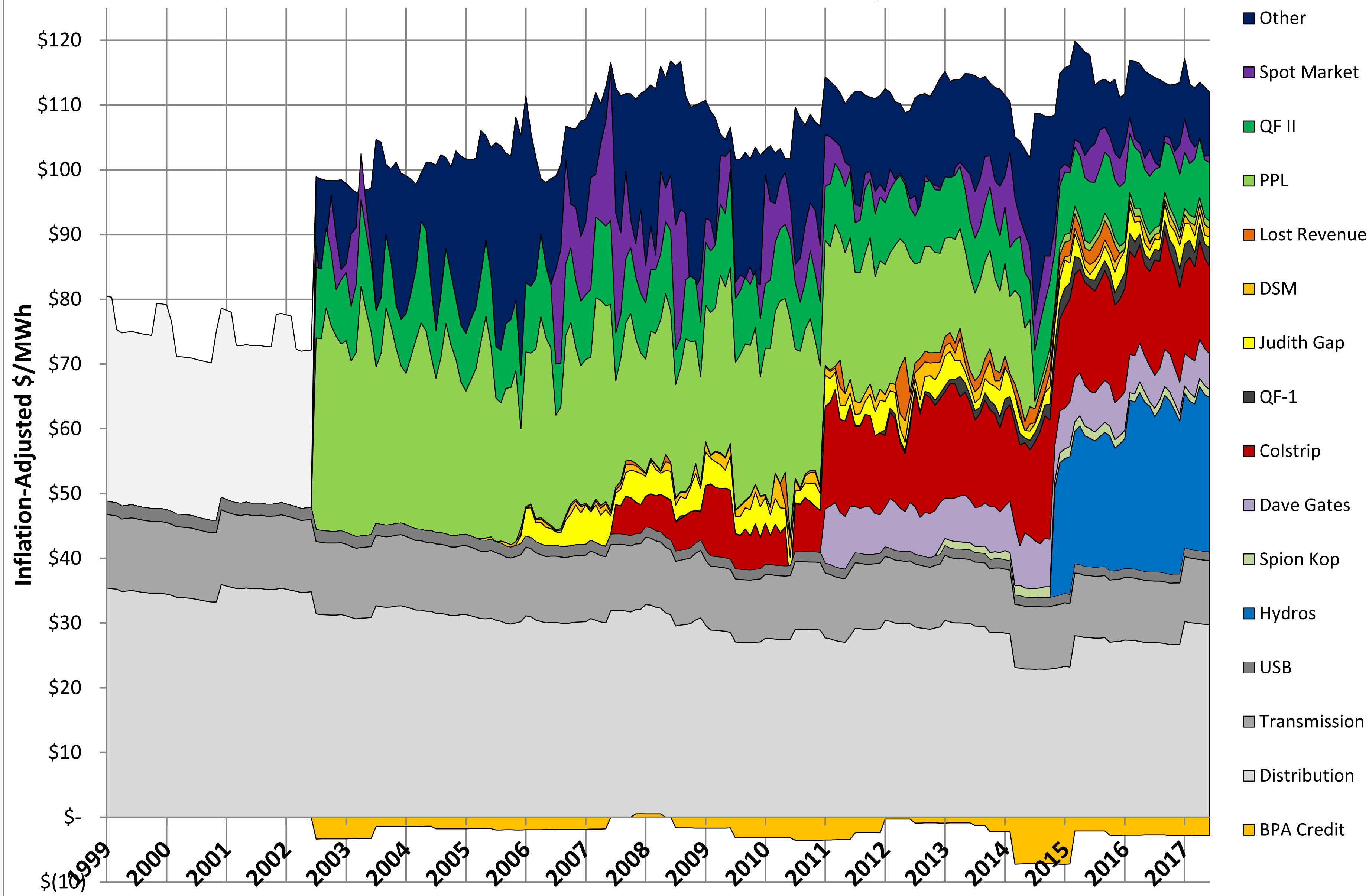
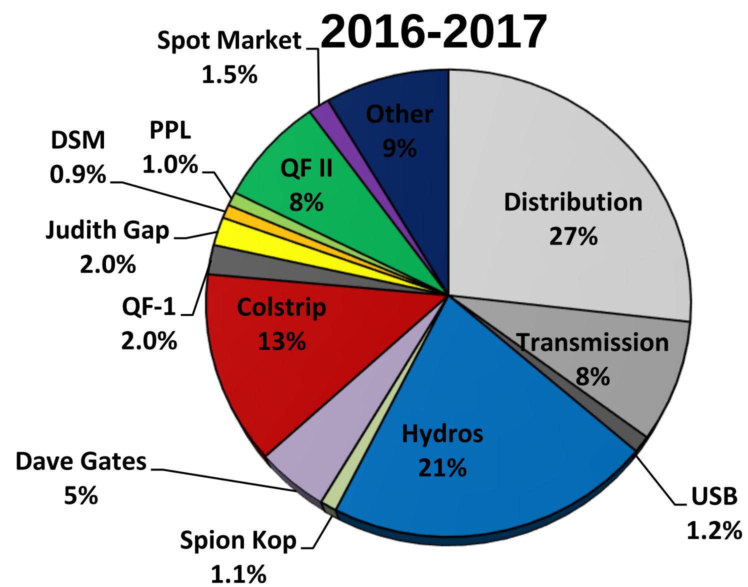
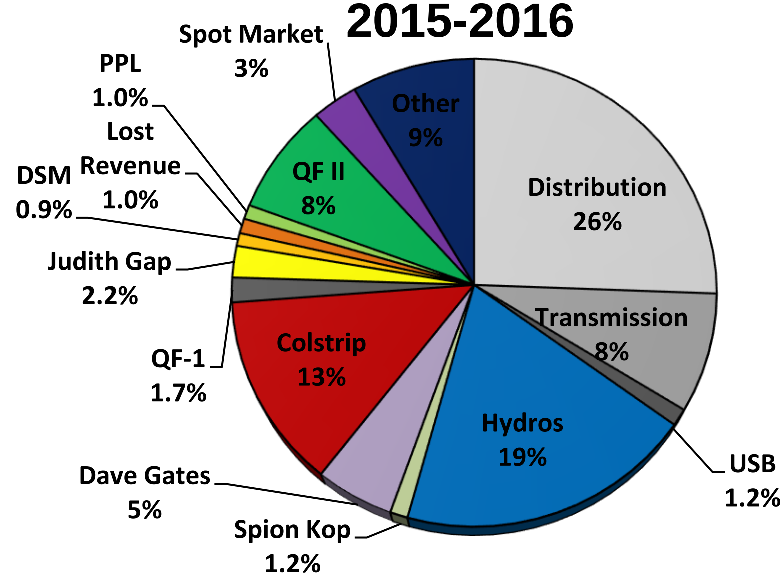
3 *See Portland Gen. Elec. Co. v. BPA*, 501 F.3d 1009, 1014 (9th Cir. 2007).

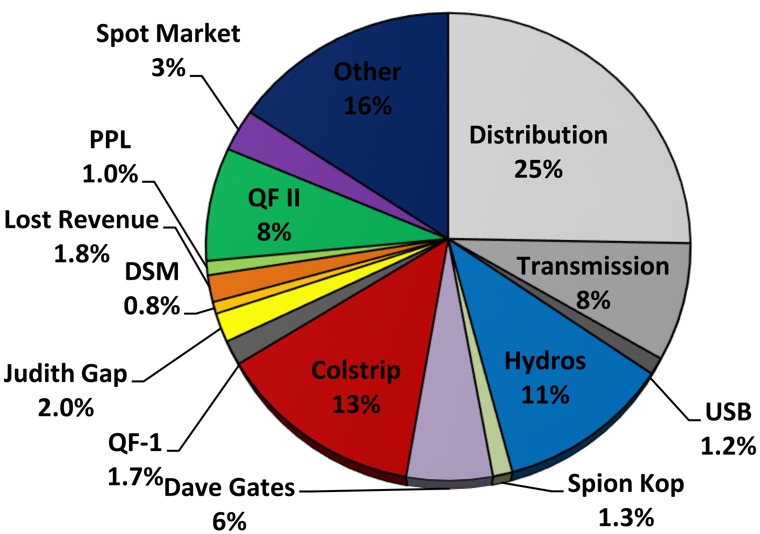
NorthWestern Residential Electricity Rates

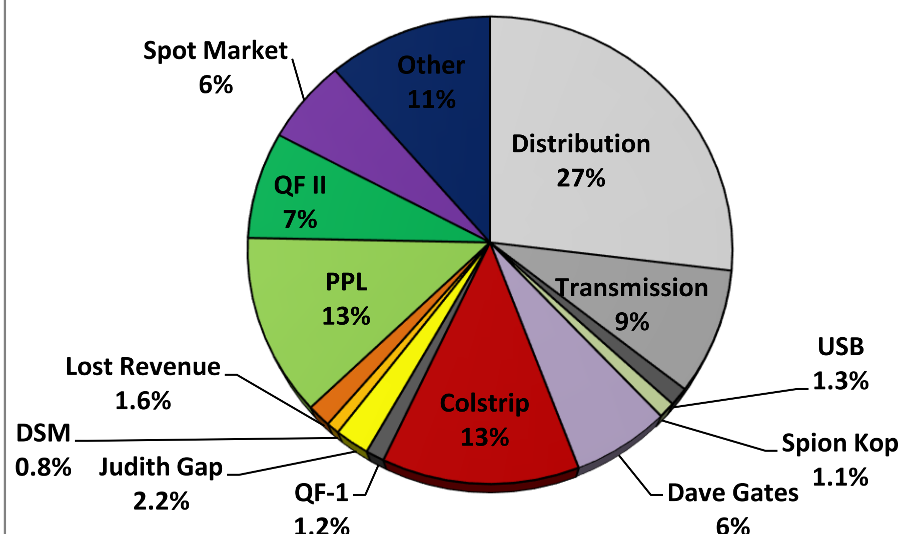


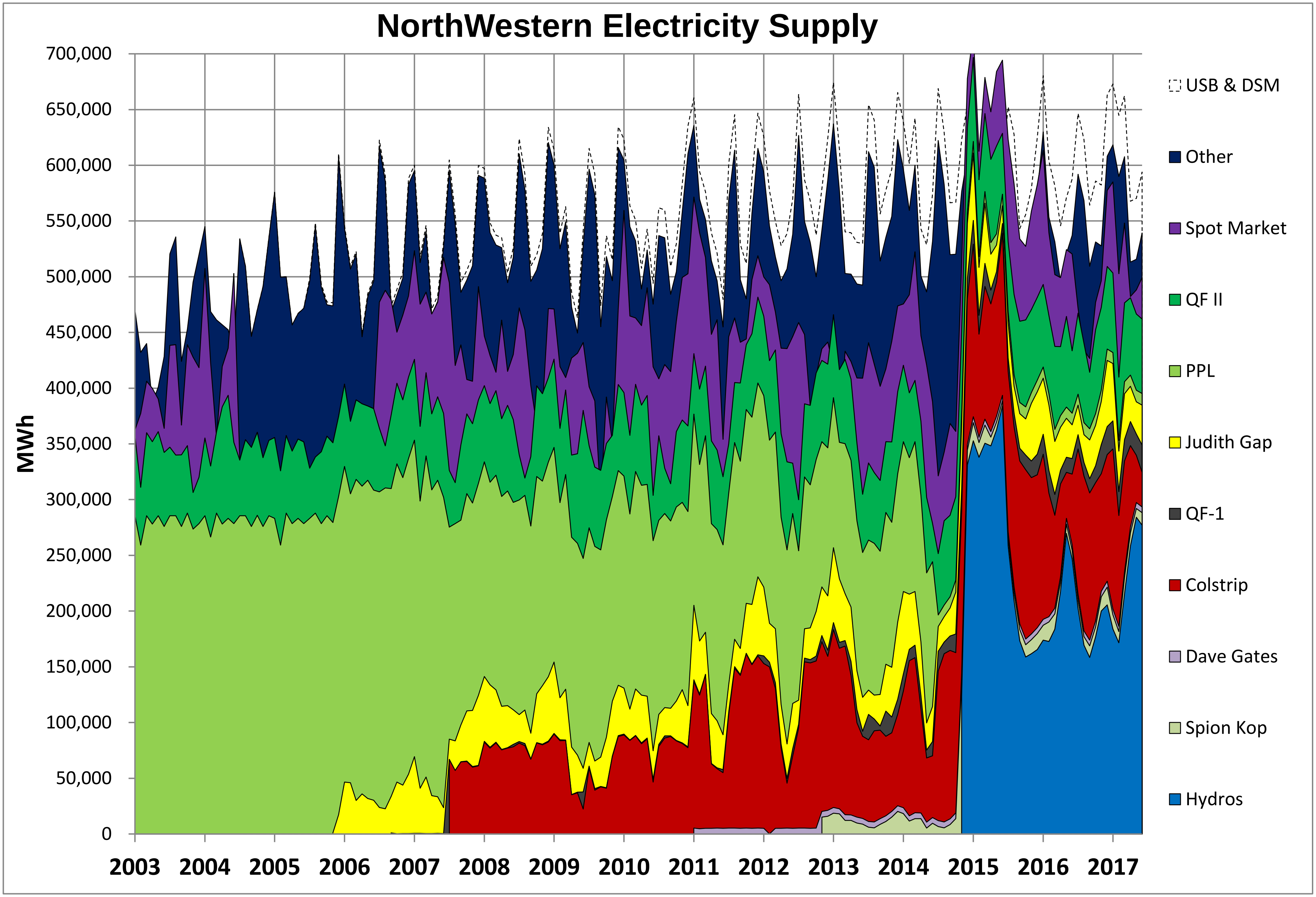
NorthWestern Residential Electricity Rates










NorthWestern Electricity Supply
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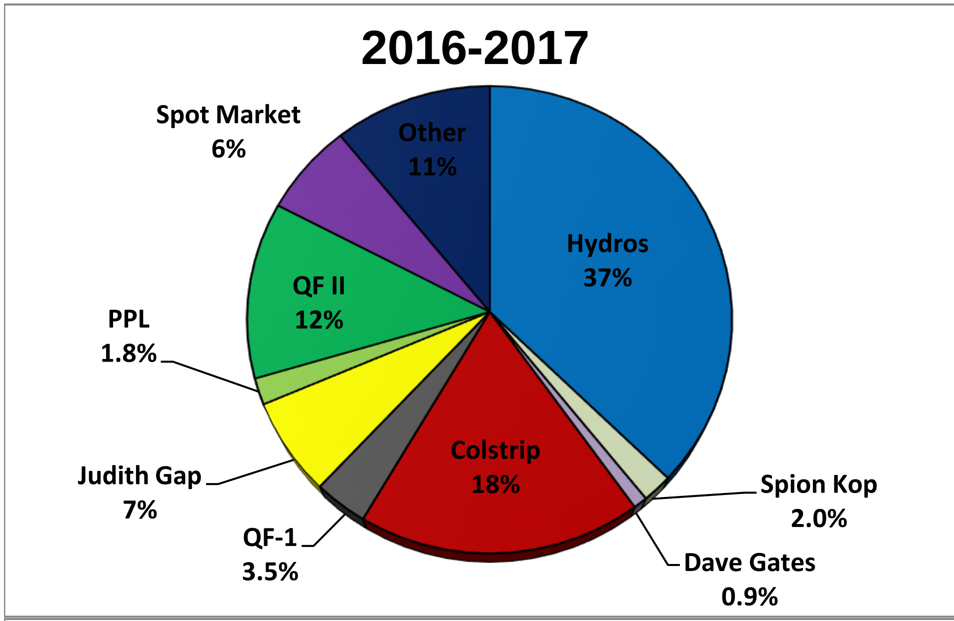
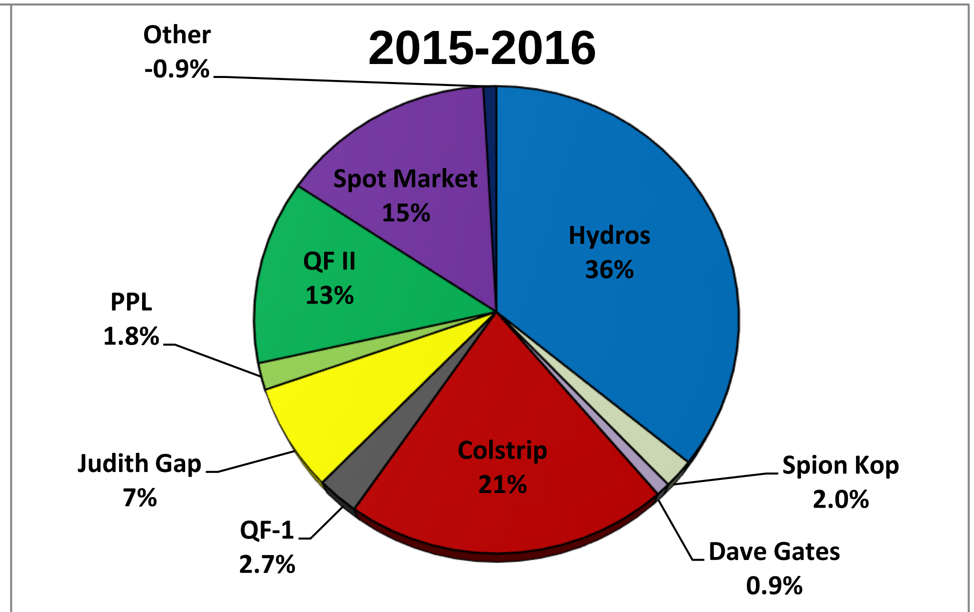
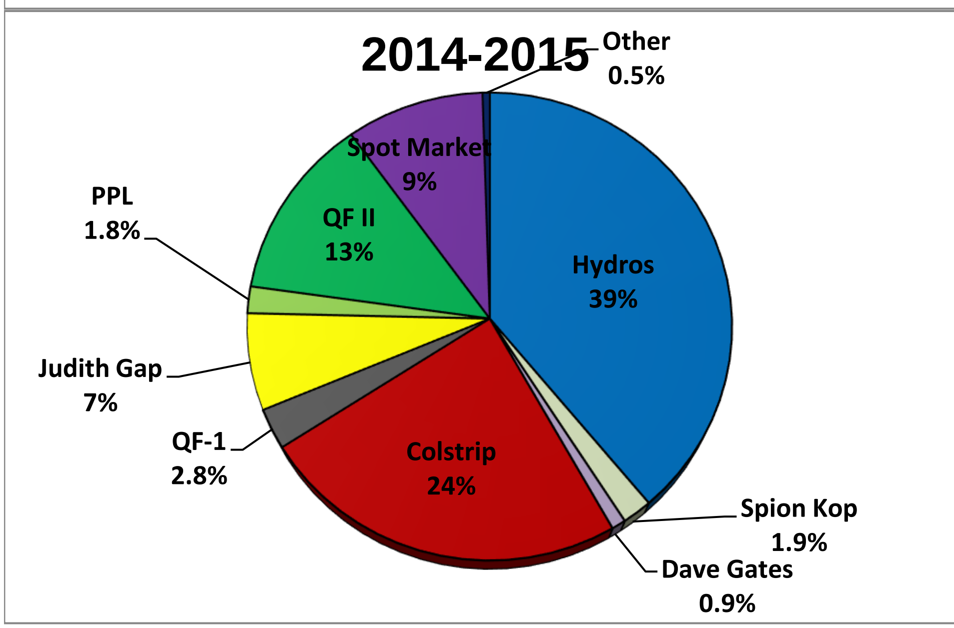
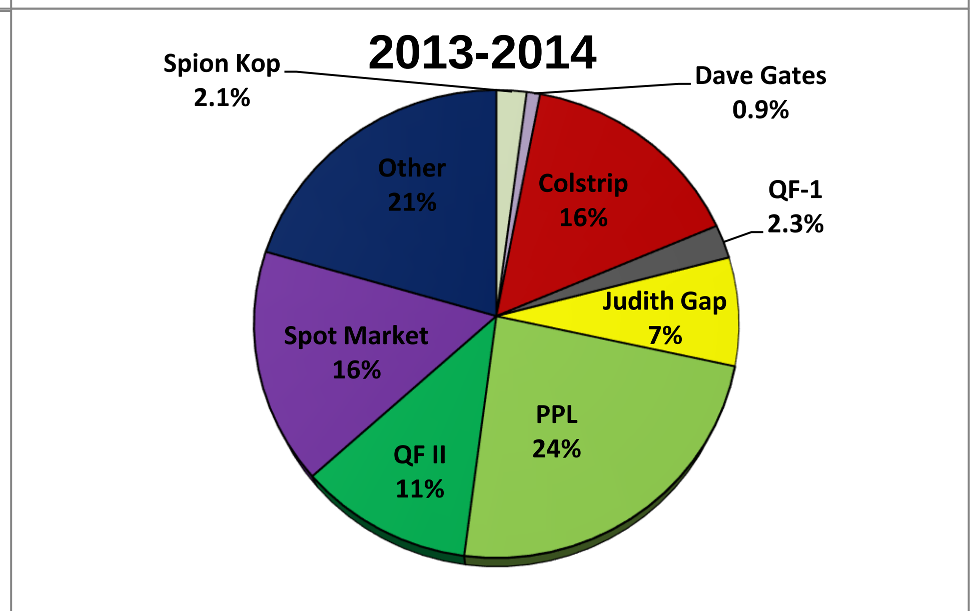
2012
2013
2014
2015
2016
2017
USB & DSM
Other
Spot Market
QF II
PPL
Judith Gap
QF-1
Colstrip
Dave Gates
Spion Kop
Hydros

NorthWestern Electricity Supply

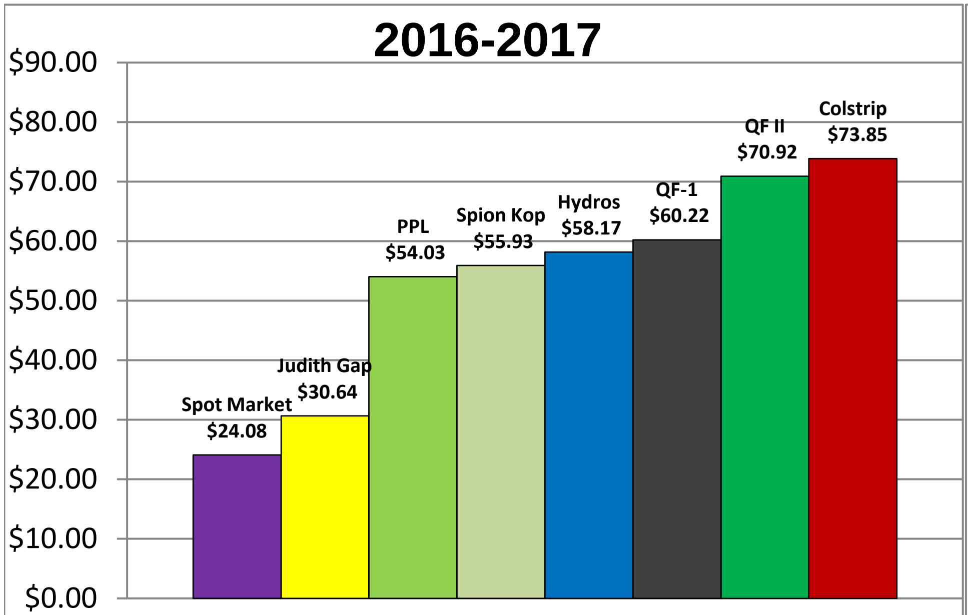


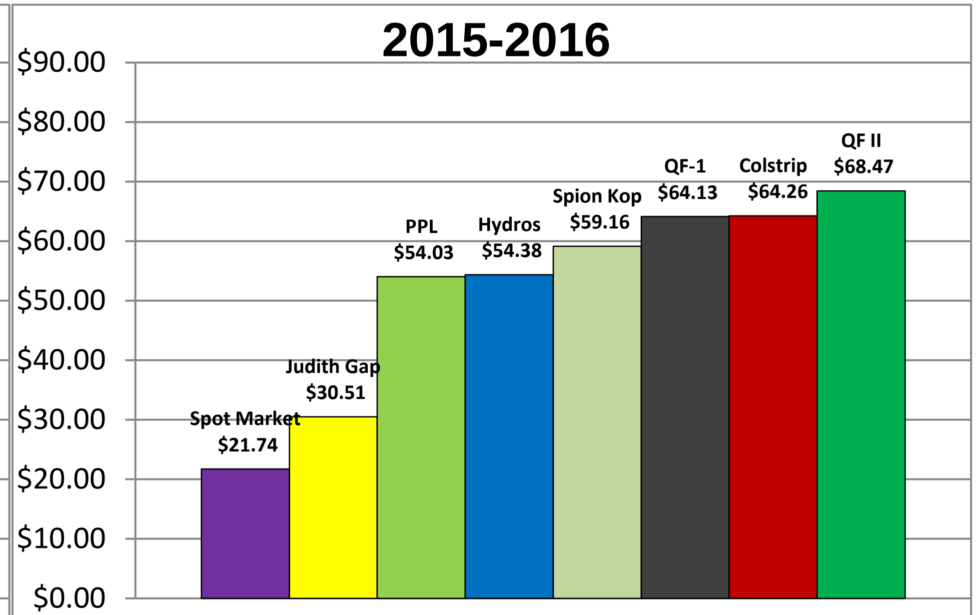


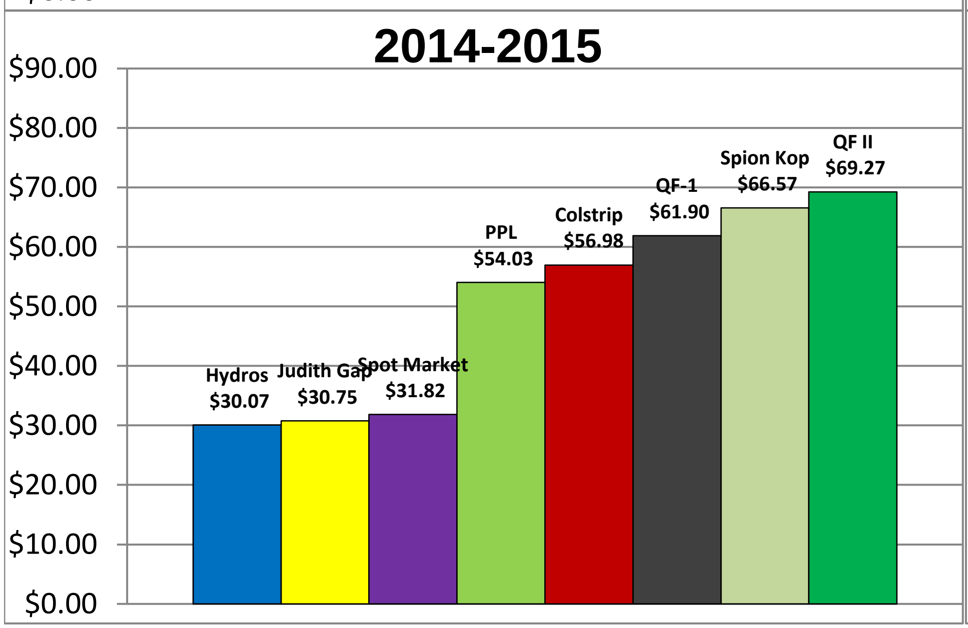


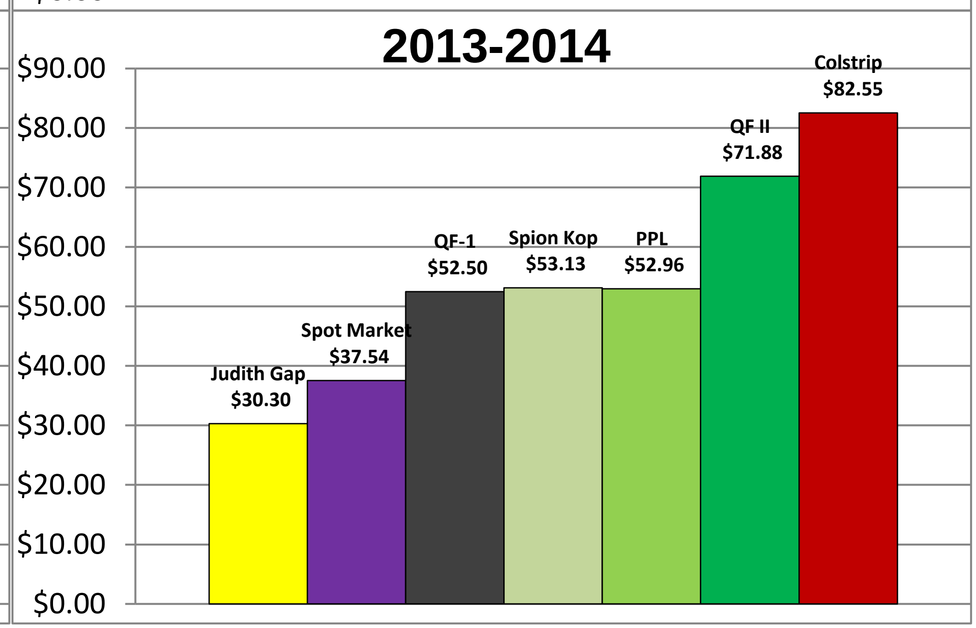


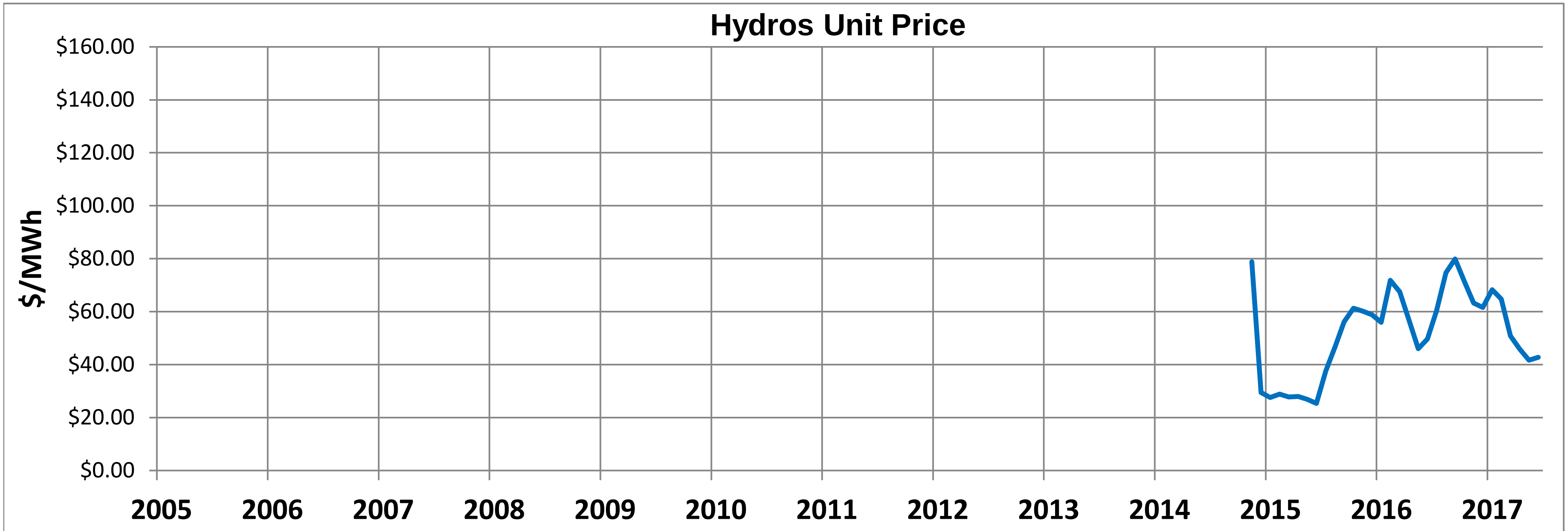
Selected NorthWestern Electricity Unit Prices

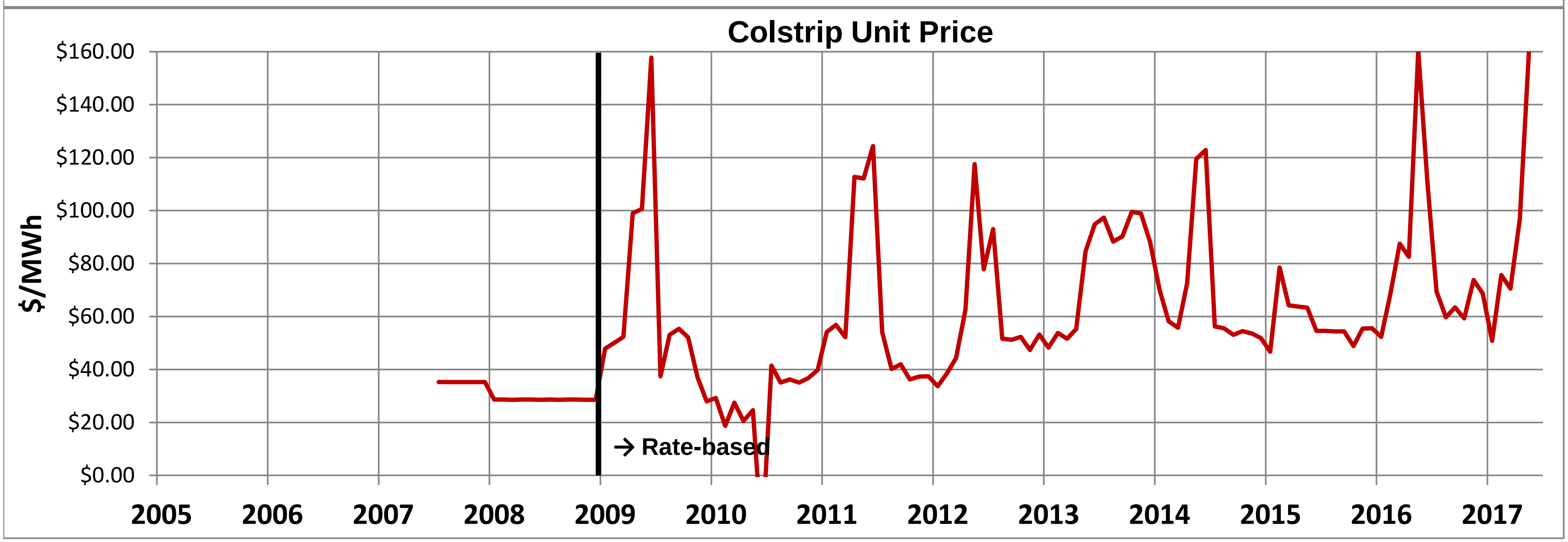


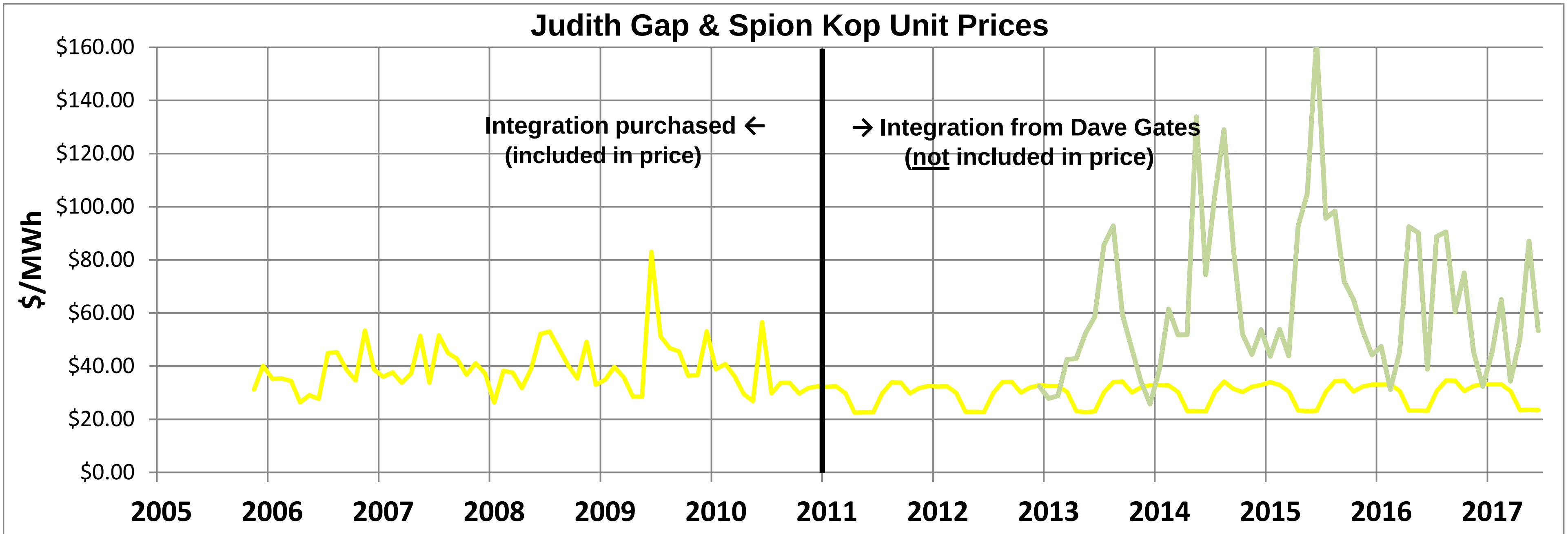


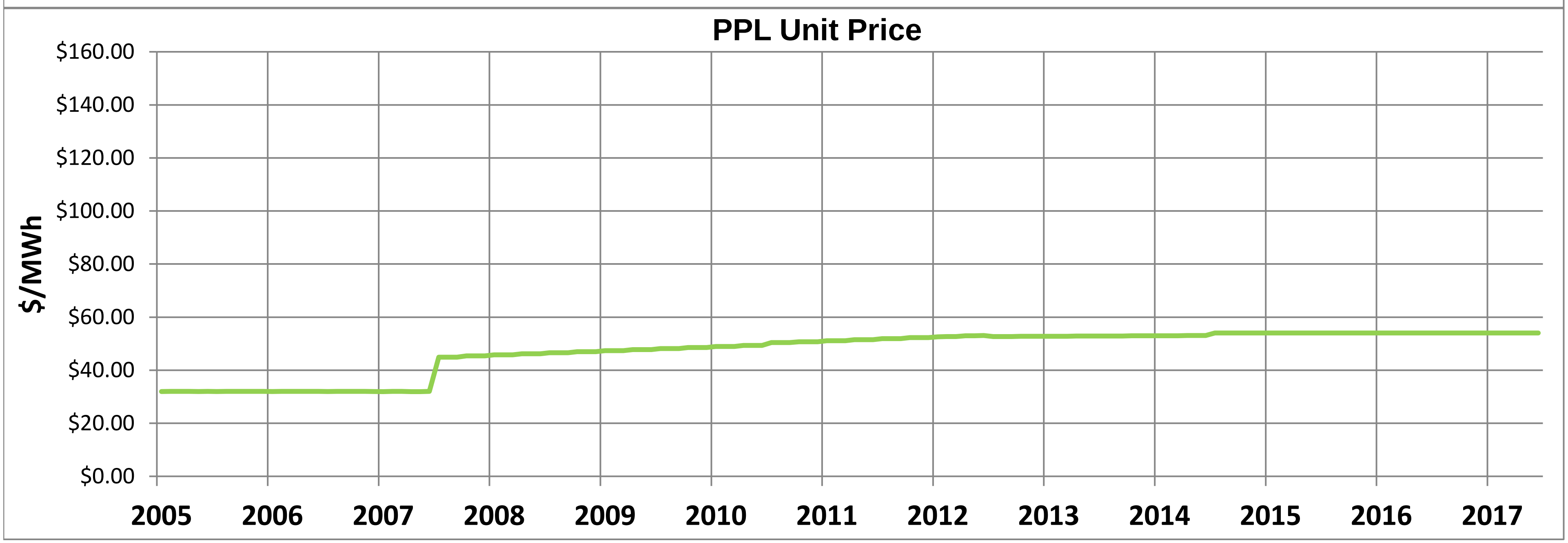


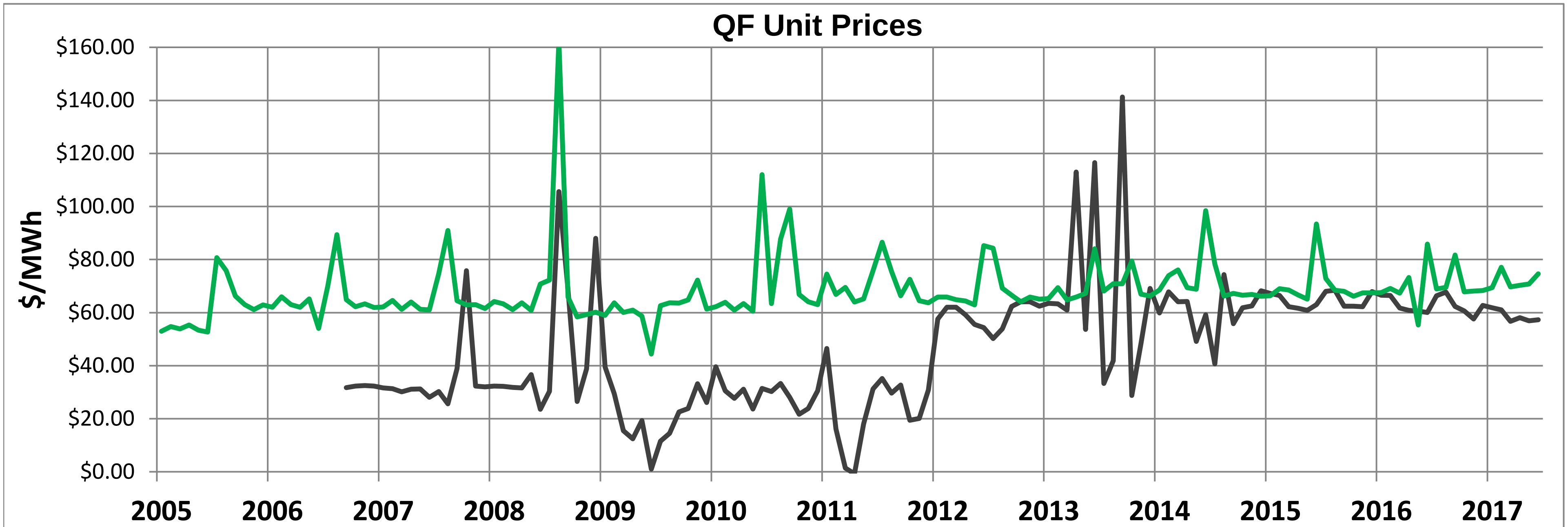


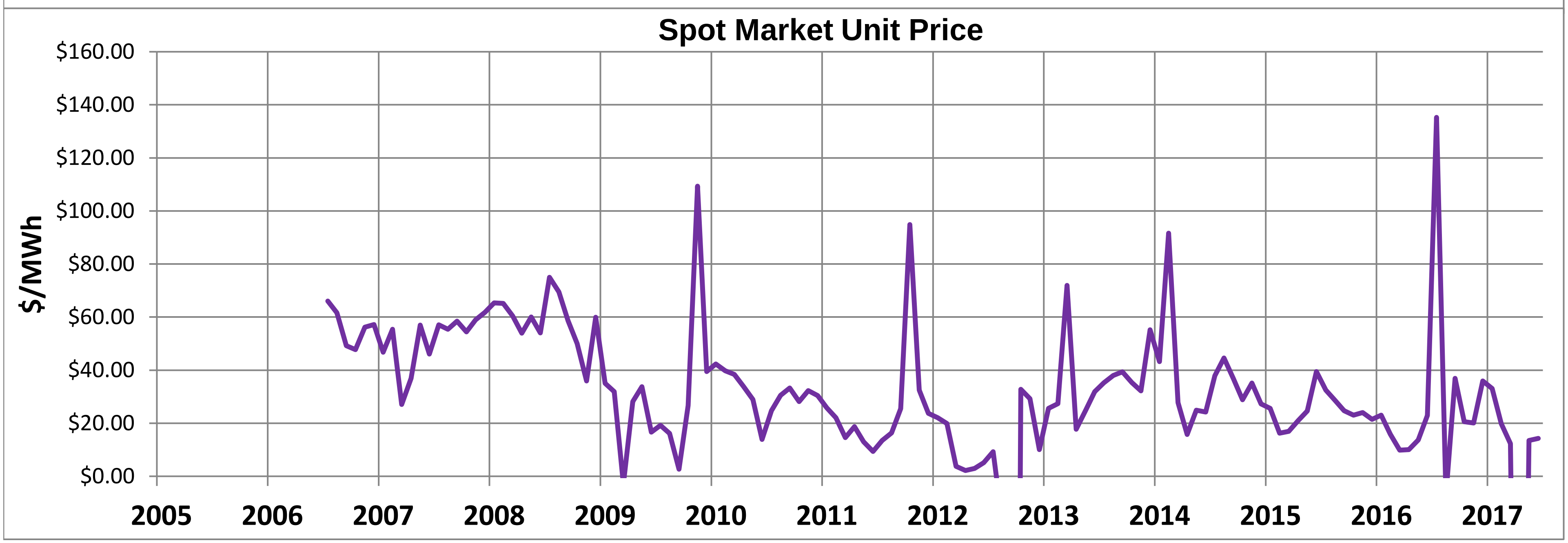

Hydros Unit Price
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
$/MWh
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017


Colstrip Unit Price
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
$/MWh
→ Rate-based
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017


Judith Gap & Spion Kop Unit Prices
Integration purchased ←
(included in price)
→ Integration from Dave Gates
(not included in price)
$/MWh
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017


PPL Unit Price
$/MWh
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017


QF Unit Prices
$/MWh
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017


Spot Market Unit Price
$/MWh
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017

Direct Testimony and Exhibits of

David A. Schlissel

on behalf of MEIC and Sierra Club

Exhibit DAS-3

NOTE: Exhibit DAS-3 contains an Excel workbook, which has been provided to the Commission and service list on a CD-ROM

NorthWestern Energy
Delivering a Bright Future

March 3, 2014

Ms. Kate Whitney
Montana Public Service Commission
1701 Prospect Avenue
P.O. Box 202601
Helena, MT 59620-2601

RE: Docket No. D2013.12.85
PPLM Hydro Assets Purchase
PSC Set 3 Data Requests (059-066)
UPDATED RESPONSE TO PSC-066

Dear Ms. Whitney:

Enclosed for filing is a copy of NorthWestern Energy's updated response to PSC-066 in PSC Set 3 Data Requests. A hard copy will be mailed to the most recent service list in this Docket this date. The Montana Public Service Commission and the Montana Consumer Counsel will be served by hand delivery this date. This updated data response will also be e-filed on the PSC website and emailed to counsel of record.

Should you have questions please contact Joe Schwartzenberger at 406 497-3362.

Sincerely,

Nedra Chase

Nedra Chase
Administrative Assistant
Regulatory Affairs

NC/nc
CC: Service List

CERTIFICATE OF SERVICE

I hereby certify that a complete copy of NorthWestern Energy's updated response to PSC-066 in PSC Set 3 Data Requests, in Docket D2013.12.85, the PPLM Hydro Assets Purchase, has been hand delivered to the Montana Public Service Commission and to the Montana Consumer Counsel this date. This updated data response will be e-filed on the PSC website and served on the most recent service list by mailing a copy thereof by first class mail, postage prepaid. This updated data response will also be emailed to counsel of record.

Date: March 3, 2014

Nedra Chase

Nedra Chase
Administrative Assistant
Regulatory Affairs

Docket No D2013.12.85
Hydro Assets Purchase
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Essex Partnership, LLC
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Ivoryton, CT 06442

PSC-066

Regarding: Evaluating Other PPLM Assets
Witness: Stimatz

Please provide the version of your Exhibit_(JMS-1) that included analysis of other assets owned by PPLM referenced on JMS-4:9-10.

RESPONSE (January 24, 2014):

NorthWestern objects to this data request to the extent that it seeks information or documents not relevant to the issues in this docket, which is beyond the permissible scope of discovery. The scope of discovery is limited to non-privileged matters that are relevant. M. R. Civ. P. 26(b)(1). The information sought must be reasonably calculated to the discovery of admissible evidence. *Id.* Initially, the party responding to discovery must make a good faith determination of relevance. If the party responding is not permitted to determine the relevance of material and is required to produce all material so that the requesting party can determine relevance, the limitation that irrelevant information or documents are not discoverable is violated. Without waiving said objection, NorthWestern provides the following response.

See the file in the folder labeled "PSC-066" on the attached CD. The model alone is not reflective of the acquisition decision ultimately made by NorthWestern. In the end NorthWestern did not bid on the combined hydro and thermal assets. Many other factors and risks were analyzed by NorthWestern as described in the Prefiled Direct Testimony of Brian Bird, pages 3 through 21.

UPDATED RESPONSE (March 3, 2014):

By Notice of Commission Action dated February 20, 2014, the Commission overruled NorthWestern's objection to this data request.

Notwithstanding our objection or the Commission's subsequent response, NorthWestern confirms that the above response is a complete response to the data request.

CERTIFICATE OF SERVICE

I hereby certify that on the 12th day of February, 2019, the **Direct Testimony and Exhibit of David A. Schlissel on behalf of MEIC and Sierra Club** was e-filed with the Montana Public Service Commission and served by first-class mail, postage prepaid, and electronic mail, unless otherwise noted, on the following:

By Federal Express

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Chief Counsel/ Administrator
Public Service Commission
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Helena, MT 59620-2601
(By Federal Express)

By First Class and Electronic Mail

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for Federal Executive Agencies

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