STATE OF IOWA

BEFORE THE IOWA UTILITIES BOARD

IN RE:	)	DOCKET NO. EPB-2020-0156
MIDAMERICAN ENERGY COMPANY ELECTRIC POWER GENERATION FACILITY EMISSIONS PLAN	)	DIRECT TESTIMONY

DIRECT TESTIMONY OF DAVID B. POSNER

ON BEHALF OF IOWA ENVIRONMENTAL COUNCIL ENVIRONMENTAL LAW & POLICY CENTER SIERRA CLUB

DECEMBER 17, 2020

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I. Introduction

Q. Please state your name and business address.

A. My name is David B. Posner. I am an independent consultant. My business address is 1801 Wedemeyer Street Unit 621, San Francisco, CA 94129.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of the Iowa Environmental Council, Environmental Law & Policy Center, and Sierra Club.

Q. Please summarize your educational background and recent work experience.

A. I graduated from Cornell University in 1989 with a Bachelor of Arts degree in history. In 1997, I received a Doctor of Philosophy degree in history from Yale University. In 2003, I received a Master of Business Administration degree in finance from the Wharton School of the University of Pennsylvania.

Since 2006 I have worked analyzing energy finance matters for the U.S. Department of Energy as well as for various non-profit organizations (e.g., Sierra Club, Rocky Mountain Institute) and for-profit companies (e.g., IHS Markit). I have submitted testimony before the New Mexico Public Regulation Commission (19-00018-UT), the Oregon Public Utility Commission (UE 374), and the Virginia State Corporation Commission (PUR-2020-00015).

A copy of my current resume is included as Posner Direct Exhibit 1.

Q. Have you previously testified before the Iowa Utilities Board?

A. No.

Q. What is the purpose of your direct testimony in this proceeding?

A. The purpose of my testimony is to assess the cost-effectiveness of MidAmerican Energy Company's **(**MEC or Company) Emission Plan and Budget, and more specifically to analyze and discuss potential ratepayer cost savings from the early retirement of George Neal North (Unit 3) and George Neal South (Unit 4) at the end of 2022, as opposed to continued operation, and their replacement with clean energy.

Q. Please identify the documents and filings on which you based your opinions.

A. I have relied on operational cost and plant balance data made publicly available in the Company's reporting to the Federal Energy Regulatory Commission (FERC), specifically FERC Form 1, and the Energy Information Administration (EIA), specifically EIA Forms 860 and 923, as well as data made available by the Midcontinent Independent System Operator (MISO).

Q. Please summarize your findings.

A. My main findings are as follows:

1. Neal Unit 3 and Neal Unit 4 have been uneconomic to operate for several years.[1] In 2019, Unit 3 operated at only a 35.5% capacity; on the basis of reported operating costs, estimated undepreciated capital in rate base, and authorized return, this translates to $28.12/megawatt-hour (MWh) for operations, maintenance, and fuel plus $27.51/MWh for return of, and on, capital, for a total of $55.63/MWh. That same year, Unit 4 operated at just 27.6% capacity, which translates into $37.61/MWh for operations,

[1] *See* RPU-2019-0001, Revised Direct Testimony of Paul Chernick (Public), (filed Sept. 26 2019) *attached as* Posner Direct Exhibit 2; RPU-2019-0001, Direct Testimony of Uday Varadarajan, (filed Aug. 1, 2019), *attached as* Posner Direct Exhibit 3; and Sierra Club, *The Coal Truth: MidAmerican can save customers millions by retiring uneconomic coal plants* (August 2020), *attached as* Posner Direct Exhibit 4.

maintenance, and fuel plus $23.82/MWh for capital costs, for a total of $61.43/MWh. As such, per MWh costs for operations, maintenance, and fuel at both units are higher than my estimated all-in cost for a wind power purchased agreement adjusted to account for the market value of energy, capacity, and services of the Neal units. I estimate the latter cost to be $26.87/MWh. The "Market Value Adjustment" I apply is discussed at length in the methodology section.

2. Retirement of MEC's share of Neal Unit 3 at the end of 2022 with 10-year accelerated cost recovery of a regulatory asset and replacement of the full market value of the services it delivered to Midcontinent Independent System Operator (MISO) through utility-owned wind eligible for 80% of the Production Tax Credit (PTC) could actually lower the cost of energy by 1.4% on a levelized cost basis. With the employment of a lower-cost approach to recovery of the retired asset's undepreciated plant balance and decommissioning costs, for example a refinancing with corporate debt (a "green bond"), long-term savings would increase to 9.7%.

3. Because the economics of Neal Unit 4 are significantly worse than those of Unit 3, retirement at the end of 2022 with 10-year accelerated cost recovery of a regulatory asset and replacement of the full market value of the services it delivered to MISO through utility-owned wind eligible for 80% of the PTC could lower the cost of energy by 14.7% on a levelized cost basis. With a green bond, long-term savings would increase to 22.6%.

4. In the event the Iowa Utilities Board (the Board) determines that these units should be retired before they are completely depreciated, it should consider using financial mechanisms other than a regulatory asset earning the full approved rate of return. Given the Company's financial strength and the prevailing favorable interest rate environment, MEC could issue corporate bonds (and label them "green") to refinance existing debt and return the equity investment in the units.

Q. Please summarize your recommendations.

A. I recommend that MidAmerican's Emission Plan and Budget include the retirement of Neal Unit 3 and Neal Unit 4, as they are uneconomic, using low-cost debt for refinancing plant balances and new clean resources for replacement. This is the most cost-effective approach to managing emissions from these units, thereby safeguarding ratepayers' interests in the near and long term.

II. Methodology

Q. What analyses have you performed?

A. My analysis comprised four steps:

1. I assessed the current cost to ratepayers of MEC's jointly owned Neal Unit 3 and Neal Unit 4. I used data from 2019 and 2018 FERC Form 1 as well as 2019 EIA Forms 860 and 923. This analysis estimated revenues needed to cover operating expenses, recovery of remaining undepreciated capital over remaining proposed unit lives, and the return on undepreciated capital over time at the existing authorized rate of return.

2. Second, I compared the total cost to ratepayers of these assets with the hourly market value of the energy, capacity, and ancillary services provided between 2014 and 2018. To assess the value of these services, I relied on publicly available hourly historical market data made available by MISO, including nodal Day-Ahead Locational Marginal Prices (LMPs), Market Clearing Prices (MCP) in the MISO Ancillary Services Market (ASM), annual capacity auction clearing prices, data on day-ahead cleared offers, and historical wind production across MISO.[2] In discovery, the Company provided no alternative information beyond this publicly available information to use for such analysis.[3] These data were compared to the historical market value of these services with potential alternatives to their continued operation such as marginal purchases of energy, capacity, and ancillary services from the market as well as substitution of wind generation to deliver these services. This procedure is the "Market Value Adjustment." It is not the same as MISO's assignment of a capacity value to wind facilities. Rather, this analytical approach, developed by Rocky Mountain Institute (RMI), is to build enough wind so that it can be sold into the market to earn all that an old plant did from energy, capacity, and ancillary services such that the Company should, given a functioning market going forward, be able to purchase all the energy and other values once provided by the old plant.

[2] MISO, Market Reports, at: https://www.misoenergy.org/markets-and-operations/real-time--market-data/market-reports.
[3] Posner Direct Exhibit 5, "MEC Responses to ELPC IEC Second Set of Data Requests."

3. Using the Market Value Adjustment as well as data on the cost of wind generation (primarily, *Lazard's Levelized Cost of Energy Analysis—Version 14.0*), I analyzed the cost of replacing the output from Neal Unit 3 and Neal Unit 4 with wind generation operating at a 41% capacity factor and receiving 80% of the PTC (i.e., facilities that began construction in 2017 and would enter service by the last day of 2022, with eligibility under the "safe harbor" in Internal Revenue Service (IRS) Notice 2020-41).

4. Lastly, I have compared ratepayer costs of retirement using alternative financing mechanisms for the undepreciated plant balances of Neal Unit 3 and Neal Unit 4, namely:

   i. a Regulatory Asset scenario with accelerated recovery of capital over 10 years and a full utility return on capital, in combination with a wind power purchase agreement (PPA) for replacement; and

   ii. a Green Bond scenario amortized over 10 years in combination with utility-owned wind assets for replacement.

Q. How have you determined the size of the replacement assets?

A. Coal and gas facilities provide a broader range of grid services beyond the energy they produce and deliver. Flexibility with regard to when energy can be delivered and the ability to provide reliability services such as regulation and spinning reserves also have value. Thus, a dispatchable plant that can operate to serve peak demand *may* be more valuable than a non-dispatchable plant. As MEC operates within MISO, and since MISO operates day-ahead and real-time markets that value ancillary services, the benefits and costs associated with the delivery of these additional services as well as the hourly variation in the value of the energy delivered can be quantified.

To reiterate, using the Market Value Adjustment, I allow for the fact the market value of a megawatt-hour (MWh) of energy produced by a wind facility in Iowa may at times be lower than the value of a MWh produced by the fossil-fueled facility it replaces. My analysis led me to estimate that each megawatt-hour of wind would be worth only 85% of each MWh of retired coal generation. Thus, the amount of replacement wind capacity procured in the analysis is greater than if I were to propose replacing the energy supplied by Neal Unit 3 and Neal Unit 4 on a 1:1 basis.

Q. What cost do you assume for wind assets?

A. The assumed cost of wind is $1.25 million per megawatt (MW).[4]

Q. What assumption do you make regarding the federal Production Tax Credit (PTC) for wind?

A. I assume that wind entering service in 2023 could receive the federal Product Tax Credit at 80% of its full value, under the extended safe harbor in IRS Notice 2020-41.

Q. How do you account for Operations & Maintenance (O&M) costs for wind?

A. To cover O&M costs of wind, I apply a $12.13/MWh in Year 1, and then inflate each year to account for general inflation.[5]

Q. How do you account for O&M costs for Neal Unit 3 and Neal Unit 4?

A. I used 2019 actuals derived from FERC and EIA reports (as referenced above) and inflated them in subsequent years to account for general inflation.

[4] Lazard, *Lazard's Levelized Cost of Energy Analysis—Version 14.0* (2020); 11. I use the midpoint for onshore wind.
[5] NREL, 2020 Annual Technology Baseline *available at* https://atb.nrel.gov/electricity/2020/data.php.

Q. What assumption did you adopt for the projected life of the wind assets?

A. Thirty years.

Q. How do you compare 30-year wind assets with coal plant Business as Usual (BAU) baseline, when those coal plants have far shorter remaining lives?

A. To enable an apples-to-apples comparison with the replacement scenarios, the BAU scenarios for the two units include market purchases of energy to replace the retired generation from the year after retirement through the end of the 30-year horizons of the wind assets. These purchases are priced at inception at my near-term market cost of replacement energy, capacity, and ancillary services and then inflated each year to account for macro inflation.

Q. What discount rates do you use?

A. I discount ratepayer costs at 7%, which is an average of allowed utility Weighted Average Costs of Capital (WACCs). I discount utility earnings at 11%, the Company's approved Return on Equity.

Q. What assumptions do you make regarding the green bond?

A. The interest rate for the A-rated bond is assumed to be 3%, amortized over 10 years.

Q. What information supports this interest rate?

A. MEC has a Standard & Poor's (S&P) issuer credit rating of A, which was last reviewed and left unchanged on October 26, 2020.[6] This is a solid investment-grade rating, reflective of the company's strong financials. The yield of A-rated corporate debt has been below 3% since the beginning of 2020 (that is, before the COVID crisis) and is now around 1.5%.

Figure 1: Singe A corporate Yields

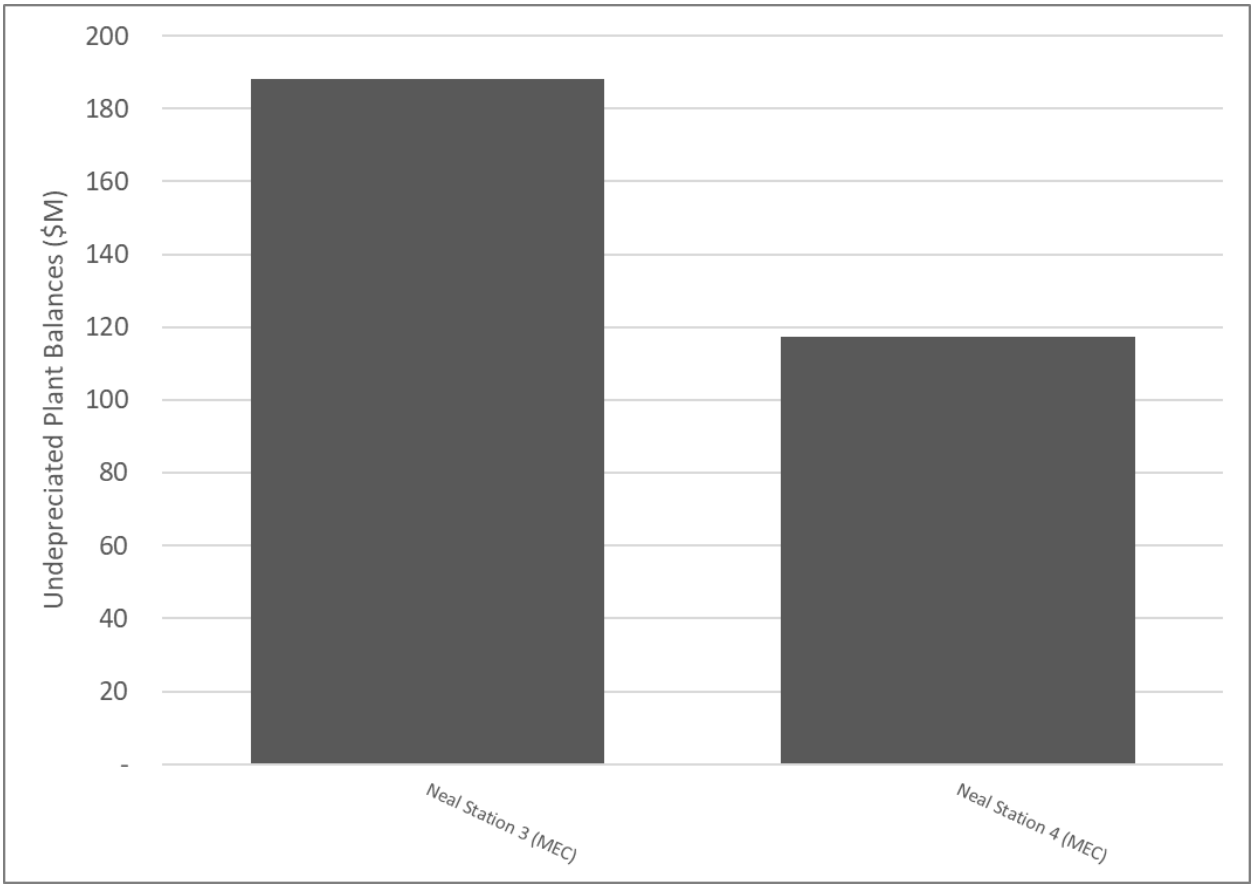
Source: https://fred.stlouisfed.org/series/BAMLC0A3CAEY

[6] From SNL.com, last accessed on 14 December 2020.

Q. Can the Company assume this increased debt burden on its balance sheet without damaging its credit rating?

A. Refinancing the 2022 retirement costs for both Neal Unit 3 and Neal Unit 4, including decommissioning costs, is estimated to total $305 million. This is a small fraction of MEC's $7 billion total debt load as of the close of the third quarter of 2020.[7]

Figure 2: Estimated 2022 Retirement Costs of Neal Unit 3 and Neal Unit 4



Credit rating agencies would also likely react positively to the growth in rate base from significant reinvestment in new wind assets, as these would boost future revenue requirements.

Q. How do Green Bonds affect the Company shareholders?

A. Bonds do not provide an earnings opportunity to the Company's shareholders. However, shareholders would earn on replacement resources that are Company-owned. Given the capital intensity of renewable assets relative to fossil-fired assets, earnings would increase significantly if these new assets are included in rate base.

Q. Have you placed any monetary value on environmental and health benefits that would result from the closure of these two plants?

A. No.

Q. Have you included any incremental forward-looking capital expenditures (CAPEX) for the Neal Units?

A. I have not included incremental CAPEX for the Neal units or the replacement assets after initial investment. This is a conservative aspect of my modeling, as incremental CAPEX costs are more likely for aging coal units than for new wind generation, especially if environmental regulations tighten. This would increase the price of the BAU scenarios. It bears mentioning that in discovery the Company provided a table that identified no future CAPEX for the units through 2029—an unlikely prospect.[8]

Q. Are there other significant model assumptions that you would like to note?

A. In the absence of precise data, I estimate Accumulated Deferred Income Taxes (ADIT) for the existing units. For new wind assets, I use 5-year modified accelerated cost recovery system for 95% of the asset's cost. For the bond scenarios, ADIT is amortized along the life of the bond.

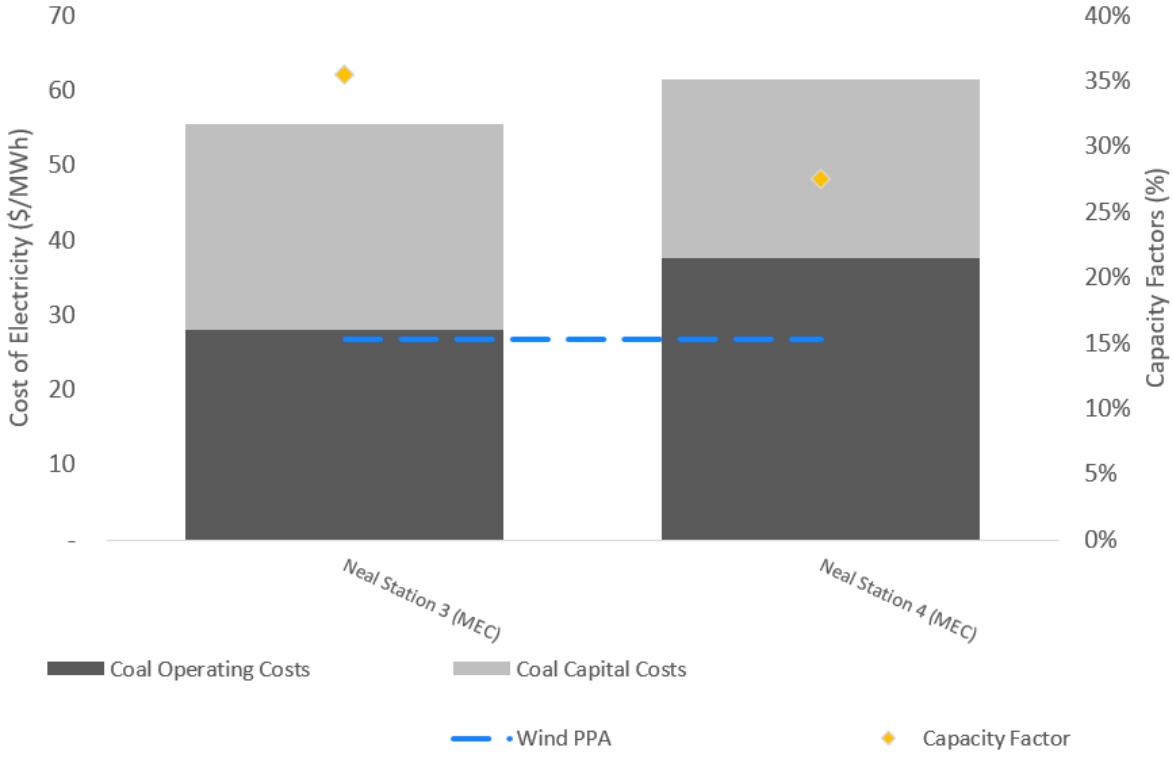
[7] SNL.com, last accessed on 14 December 2020.
[8] *See* Posner Exhibit 5, "MEC Responses to ELPC IEC Second Set of Data Requests," at Question 7.

III. Findings

Q. Why are the economics of retiring Neal Unit 3 and Neal Unit 4 and replacing them with new wind generation so attractive now?

A. The Neal units have operated recently at very low capacity factors. In 2019, Neal Unit 3 ran at 35.5% capacity factor, while Neal Unit 4 ran at only a 27.6% capacity factor. In 2020, Unit 4 utilization has plummeted even further, to only around 6% during the first seven months of 2020, as noted in a recent Sierra Club report.[9]

Figure 3: 2019 Neal Unit 3 and Neal Unit 4 Costs and Capacity Factors



Low capacity factors negatively impact operating costs because fixed O&M costs are spread over fewer units of output. They also reduce the implied replacement capacity.

[9] Exh. 4, Sierra Club, *The Coal Truth*, at 1.

Because renewable assets such as wind turbines can be built in modular fashion, they can be readily scaled to meet the replacement need. In addition, the continued availability of the PTC for wind at high levels (80% of full value in this analysis) means replacement within the next few years would be particularly cost-effective for ratepayers.

Q. What are your key data for MEC's share of Neal Unit 3?

A: The table below summarizes capital balance, lifespan, generation, and other key info:

Table 1: Summary of Assumptions for Neal Unit 3

Plant Name:	**Neal Station 3 (MEC)**
Plant Type	**Coal**
Plant Capacity	**371 MW**
Annual Net Generation of Operating Plant (Coal or Wind, MWh)	**1,152,805 MWh**
Remaining Life of Plant (Years)	**11**
Replacement Plant Type	**Wind**
Refinancing Type	**Green Bond**
Total Refinancing Amount:	**$188 m**
Total Unrecovered Utility Investment in Coal Plant:	$170 m
Utility Estimated Decomissioning Costs Net of Salvage:	$18 m
Green Bond Tenor (Years):	**10**
Green Bond Yield:	**3.00%**
Utility Allowed Return on Capital:	**7.43%**
Year 1 Financing Cost Savings from Green Bond Alone	**0.05 ¢/kWh**
Year 1 Cost Savings from Green Bond and Replacement with Wind	**0.04 ¢/kWh**

Q. What are your findings for the Neal Unit 3 BAU and the two retirement options (Regulatory Asset and Green Bond)?

A: Both replacement scenarios are cheaper than BAU on a levelized basis, by 1.4% for the regulatory asset and 9.7% for the green bond. However, the regulatory asset approach does result in a Year 1 increase in costs of 9.3%. There is no Year 1 increase with the green bond scenario; instead, costs decline by 15%.

Table 2: Neal Unit 3 Year 1 Cost of Energy

Year 1 COE ($/MWh)			
	Neal Station 3 (MEC)	**Full Utility Finance**	**Green Bond + Owned Wind**
Return of Capital	$14.84	$22.91	$6.59
Return on Capital	$12.67	$30.98	$18.75
Fuel, O&M, and Power Costs	$28.12	$6.89	$6.89
Green Bond Cost	$0.00	$0.00	$15.05
Total Cost	**$55.63**	**$60.79**	**$47.27**
Change		**9.3%**	**-15.0%**

Table 3: Neal Unit 3 Levelized Cost of Energy

Levelized Cost of Energy ($/MWh)			
	Neal Station 3 (MEC)	**Full Utility Finance**	**Green Bond + Owned Wind**
Return of Capital	$8.97	$18.17	$8.93
Return on Capital	$4.32	$16.10	$11.81
Fuel, O&M, and Power Costs	$35.28	$13.63	$13.63
Green Bond Cost	$0.00	$0.00	$9.49
Total Costs	**$48.57**	**$47.90**	**$43.85**
Change		**-1.4%**	**-9.7%**

Both replacement scenarios result in increased utility earnings ("Return on Capital") on a near-term and long-term basis, securing the interests of shareholders.

Q: What are your key data for MEC's share of Neal Unit 4?

A: The table below summarizes capital balance, lifespan, generation, and other key info:

Table 4: Summary of Assumptions for Neal Unit 4

Plant Name:	Neal Station 4 (MEC)
Plant Type	**Coal**
Plant Capacity	**262 MW**
Annual Net Generation of Operating Plant (Coal or Wind, MWh)	**632,914 MWh**
Remaining Life of Plant (Years)	**18**
Replacement Plant Type	**Wind**
Refinancing Type	**Green Bond**
Total Refinancing Amount:	**$117 m**
Total Unrecovered Utility Investment in Coal Plant:	$100 m
Utility Estimated Decomissioning Costs Net of Salvage:	$17 m
Green Bond Tenor (Years):	**10**
Green Bond Yield:	**3.00%**
Utility Allowed Return on Capital:	**7.43%**
Year 1 Financing Cost Savings from Green Bond Alone	**0.02 ¢/kWh**
Year 1 Cost Savings from Green Bond and Replacement with Wind	**0.03 ¢/kWh**

Q. What are your findings for the Neal Unit 4 BAU and the two retirement options (Regulatory Asset and Green Bond)?

A: Both replacement scenarios are cheaper than BAU on a levelized basis, by 14.7% for the regulatory asset and 22.6% for the green bond. However, the regulatory asset approach does result in a Year 1 increase in costs of 5.6%. There is no Year 1 increase with the green bond scenario; instead, costs decline by 19%.

Table 5: Neal Unit 4 Year 1 Cost of Energy

Year 1 COE ($/MWh)			
	Neal Station 4 (MEC)	**Full Utility Finance**	**Green Bond + Owned Wind**
Return of Capital	$10.29	$25.11	$6.59
Return on Capital	$13.53	$32.87	$18.75
Fuel, O&M, and Power Costs	$37.61	$6.89	$6.89
Green Bond Cost	$0.00	$0.00	$17.32
Total Cost	**$61.43**	**$64.87**	**$49.54**
Change		**5.6%**	**-19.3%**

Table 6: Neal Unit 4 Levelized Cost of Energy

Levelized Cost of Energy ($/MWh)			
	Neal Station 4 (MEC)	Full Utility Finance	Green Bond + Owned Wind
Return of Capital	$8.34	$19.41	$8.93
Return on Capital	$6.11	$16.75	$11.81
Fuel, O&M, and Power Costs	$43.95	$13.63	$13.63
Green Bond Cost	$0.00	$0.00	$10.84
Total Costs	**$58.40**	**$49.80**	**$45.21**
Change		**-14.7%**	**-22.6%**

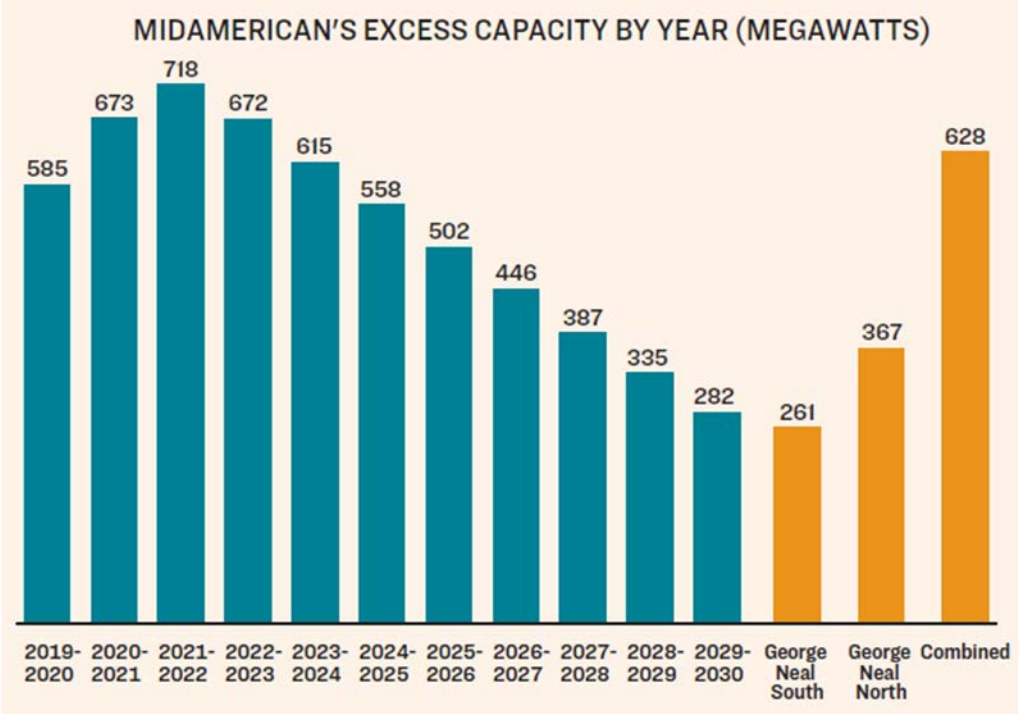
Both replacement scenarios result in increased utility earnings ("Return on Capital") on a near-term and long-term basis.

Q. **How would retirement and replacement with wind impact system reliability?**

A. I have not conducted a dispatch analysis but have instead focused on the potential to unlock large ratepayer savings through replacement scenarios that also provide earnings growth for the utility and its shareholders. While a reliability assessment must be conducted before any retirement is undertaken, I would note the following factors that suggest that reliable service is achievable with the financial benefits I have described:

1. As explained in the Methodology section above, I have employed a Market Value Adjustment that provides for the procurement of 17% more wind capacity than one would be justified by a 1:1 replacement of the 2019 generation of Neal Unit 3 and Neal Unit 4. This equivalent value is designed to provide the company the financial ability to procure from the market all the value provided by the old units.
2. There is evidence, as provided by the Company in prior case testimony by Director of Market Assessment Neil D. Hammer, that MEC has surplus capacity in excess of its

share of Neal Unit 3 and Neal Unit 4.[10] This level of surplus is expected to persist through mid-decade. Even at the end of the decade, MEC is expected to have surplus capacity greater than its share of Neal Unit 4. In other words, retirement of the Neal Units would initially reduce, but not eliminate, MEC's surplus. After mid-decade, the surplus will disappear absent new capacity. The wind assets in my replacement scenarios provide capacity, both directly and through the ability to purchase it from the market (with the value as delineated in my Market Value Adjustment analysis).



Source: Sierra Club, *The Coal Truth*

It is of course possible that the COVID pandemic has impacted the Company's planned reserve margin requirement and forecast.

[10] RPU-2018-0003, Direct Testimony of Neil D. Hammer, at 15:1-3 (filed May 30, 2018).

3. In light of the cost savings I have identified, MEC would have flexibility to add battery storage to its wind build to provide additional reliability without eliminating the ratepayer savings I have estimated:

    i. In the green bond scenario for Neal Unit 4, the Company could add (and operate) battery storage sized at 23% of the replacement wind in MWs before exhausting the Year 1 ratepayer savings. Levelized energy savings of 6.8% would remain.[11]

Q. Is standalone wind the most cost-effective replacement scenario for Neal Unit 3 and Neal Unit 4?

A. Although standalone wind would provide a cost-reducing replacement for either unit given current performance of the coal units and wind asset costs with available tax benefits, there may be even more cost-effective, and equally environmentally clean, replacement asset combinations. Research, for instance by RMI, shows has shown that clean energy technology portfolios, including wind, solar, battery energy storage, and energy efficiency, can provide regulation, spinning reserves, and other essential grid services, at a cost that is often lower than that of conventional power plants.[12] Ultimately, my analysis does not identify a least-cost replacement and does not take the place of a full resource planning effort. Rather, it shows that a conservatively estimated wind replacement—without benefit of the likely synergies of clean energy portfolio—is cheaper than the marginal costs of Neal Unit 3 and Unit 4. Over the long-term, this replacement is still cheaper than BAU

[11] Battery cost (1,033/kW) and O&M info per the 2020 NREL Annual Technology Baseline (ATB), https://atb.nrel.gov/

[12] RMI, *The Economics of Clean Energy Portfolios* (2018) available at: https://rmi.org/insight/the-economics-of-clean-energy-portfolios/; and RMI, *Pushing the Limit: How Demand Flexibility Can Grow the Market for Renewable Energy* (2018), available at https://rmi.org/demand-flexibility-can-grow-market-renewable-energy/.

even when we allow the company to recover its capital using traditional utility finance. With more economical debt financing, the proposed solution is cheaper than BAU for ratepayers both in Year 1 and over the long term, all while proving the potential for increased earnings to the company and its shareholders.

IV. Conclusion

Q. Please summarize your conclusions and recommendations.

A. I recommend that the MidAmerican's Emission Plan and Budget include retirement of Neal Unit 3 and Neal Unit 4 with a bond refinancing of remaining plant balances and replacement with wind generation (or an even more cost-effective clean portfolio determined in a complete resource planning exercise) as the most cost-effective way to manage coal plant emissions.

Q. Does this conclude your testimony?

A. Yes.

V. Appendix: Additional Tables

Neal Station 3 (MEC)	Unit Name
MidAmerican Energy Co	Utility Name
IA	State for Analysis
Record inputs for selected plant, selected utility, selected state, or all plants?	Plant
Record all inputs or just a selected input?	All
Selected input	Early_Retirement_Year
Adjust the Inputs:	
Existing Brown Plant Snapshot:	
Plant Type	Conventional Steam Coal
Gross Plant Balance ($)	$419,952,000
Current Net Plant Balance ($)	$170,123,206
Current Total Retirement Cost ($)	$188,187,825
Net Capacity (MW)	371
Assumed Year of Early Retirement	2022
Current Remaining Life (Yrs)	11
Ratepayer Cost NPV Calculation Duration	30
Fraction of Total Retirement Costs Disallowed without Refinancing (%)	0%
Amortization Period of Regulatory Asset with Early Retirement	10
Duration of Delay of Early Retirement using Accelerated Depreciation	5
Capacity Factor (%)	35.47%
Net Generation (MWh)	1,152,805
NPV Brown Plant Generation at Utility ROE Discount Rate (MWh)	7,154,902
Operating Costs ($/MWh)	$28.12
BAU Replacement Power Cost in Base Year (Year of Early Retirement)	$26.87
BAU Replacement Power Cost Escalation	2.5%
Fuel Portion of Coal MCOE	75%
Fuel Hedge Adder	0%
Securitization and Green Bond Assumptions:	
Securitization Assumed Interest Rate	3.00%
Securitization Bond Tenor	10
Green Bond Assumed Interest Rate	3.00%
Green Bond Tenor	10
Fraction of Total Retirement Costs Disallowed with Refinancing (%)	0%
Share of Securitization Savings For Transition Assistance	0%
Include Transition Assistance in Regulatory Asset Case?	Yes
Calculate Savings Relative to Regulatory Asset Case or BAU Case?	BAU Case
Does the green bond affect the utility's allowed ROR?	No
Is the utility recycling the proceeds from securitization or green bond?	Yes
Is the capital structure of the new facility different from the utility's?	No
If yes, input the new facility's debt ratio here:	50.00%
Does the new facility's capital structure impact the utility's allowed ROR?	No
Other Financial Metrics/Ratios:	
Ratepayer Discount Rate	7.00%
Shareholder Discount Rate	11.00%
Utility's Allowed ROR (%)	7.43%
Utility's Allowed ROR used (accounting for deductability of interest)	6.93%
Plant Allowed ROR used (accounting for deductability of interest)	6.93%
Retired Plant Allowed ROR used (accounting for deductability of interest)	6.93%
Wind Allowed ROR used (accounting for deductability of interest)	6.93%
Solar Allowed ROR used (accounting for deductability of interest)	6.93%
Equity Ratio (%)	52.60%
Utility's Allowed ROE (%)	11.00%
Existing Plant Allowed ROE (%)	11.00%
Retired Plant Allowed ROE (%)	11.00%
Wind Allowed ROE (%)	11.00%
Solar Allowed ROE (%)	11.00%
Assumed Allowed Preferred Equity Ratio	0.00%
Assumed Allowed Return on Preferred Equity (ROPE)	0.00%
Implied Debt Ratio	47.40%
Implied Cost of Debt	3.47%
Cost of Debt (%)	3.95%
Federal Corporate Tax Rate	21.00%
Utility's Blended Tax Rate (%)	30%
Brown Plant Assumed Starting Book-Tax Disparity	50.00%
Excess ADIT as a fraction of Current ADIT	0.00%
Macro Inflation	2.0%
O&M and Fuel Escalator	2.5%
Utility-Owned Wind Metrics:	
Wind Services Value as Percentage of Brown Plant Services Value	85%
Required Generation (MWh)	1,349,997
Wind Capacity Factor (%)	41%
Assumed Wind Capacity Factor in the Region (%)	41%
Req'd Replacement Wind Capacity (MW)	376
Wind Plant Useful Life (Yrs)	30
Capital Cost of Wind ($/MW)	$1,250,000
Transmission Costs ($/MW)	$0
Total Capital Cost of Utility-Owned Wind ($)	$469,726,306
NPV MACRS (%)	0.83
NPV Wind Generation at Utility ROE Discount Rate (MWh)	11,736,592
Impact of Capital Costs on NPV Revenue Required ($)	$503,887,422
PTC Price ($/MWh)	$20.31
NPV PTC Value ($)	$285,844,734
Impact on NPV Revenue Required of Capital Costs Net PTC ($)	$218,042,688
Wind O&M Expense ($/MWh)	$12.13
Wind PPA Metrics:	
Impact on NPV Revenue Required of Capital Costs Net PTC ($)	$218,042,688
NPV Wind Generation (MWh)	16,735,215
NPV Wind Generation at Utility Shareholder DR (MWh)	11,369,328
Wind PPA Price ($/MWh)	$22.95
Market Value Corrected Wind PPA Price ($/MWh)	$26.87
Wind PPA Assumed WACC	6.33%
Wind PPA Period (Yrs)	25
Post-PPA Period O&M Increase	100%

Neal Station 4 (MEC)	Unit Name
MidAmerican Energy Co	Utility Name
IA	State for Analysis
Record inputs for selected plant, selected utility, selected state, or all plants?	Plant
Record all inputs or just a selected input?	All
Selected input	Early_Retirement_Year
Adjust the Inputs:	
Existing Brown Plant Snapshot:	
Plant Type	Conventional Steam Coal
Gross Plant Balance ($)	$305,006,000
Current Net Plant Balance ($)	$100,366,484
Current Total Retirement Cost ($)	$117,224,291
Net Capacity (MW)	262
Assumed Year of Early Retirement	2022
Current Remaining Life (Yrs)	18
Ratepayer Cost NPV Calculation Duration	30
Fraction of Total Retirement Costs Disallowed without Refinancing (%)	0%
Amortization Period of Regulatory Asset with Early Retirement	10
Duration of Delay of Early Retirement using Accelerated Depreciation	5
Capacity Factor (%)	27.60%
Net Generation (MWh)	632,914
NPV Brown Plant Generation at Utility ROE Discount Rate (MWh)	4,874,461
Operating Costs ($/MWh)	$37.61
BAU Replacement Power Cost in Base Year (Year of Early Retirement)	$26.87
BAU Replacement Power Cost Escalation	2.5%
Fuel Portion of Coal MCOE	75%
Fuel Hedge Adder	0%
Securitization and Green Bond Assumptions:	
Securitization Assumed Interest Rate	3.00%
Securitization Bond Tenor	10
Green Bond Assumed Interest Rate	3.00%
Green Bond Tenor	10
Fraction of Total Retirement Costs Disallowed with Refinancing (%)	0%
Share of Securitization Savings For Transition Assistance	0%
Include Transition Assistance in Regulatory Asset Case?	Yes
Calculate Savings Relative to Regulatory Asset Case or BAU Case?	BAU Case
Does the green bond affect the utility's allowed ROR?	No
Is the utility recycling the proceeds from securitization or green bond?	Yes
Is the capital structure of the new facility different from the utility's?	No
If yes, input the new facility's debt ratio here:	50.00%
Does the new facility's capital structure impact the utility's allowed ROR?	No
Other Financial Metrics/Ratios:	
Ratepayer Discount Rate	7.00%
Shareholder Discount Rate	11.00%
Utility's Allowed ROR (%)	7.43%
Utility's Allowed ROR used (accounting for deductability of interest)	6.93%
Plant Allowed ROR used (accounting for deductability of interest)	6.93%
Retired Plant Allowed ROR used (accounting for deductability of interest)	6.93%
Wind Allowed ROR used (accounting for deductability of interest)	6.93%
Solar Allowed ROR used (accounting for deductability of interest)	6.93%
Equity Ratio (%)	52.60%
Utility's Allowed ROE (%)	11.00%
Existing Plant Allowed ROE (%)	11.00%
Retired Plant Allowed ROE (%)	11.00%
Wind Allowed ROE (%)	11.00%
Solar Allowed ROE (%)	11.00%
Assumed Allowed Preferred Equity Ratio	0.00%
Assumed Allowed Return on Preferred Equity (ROPE)	0.00%
Implied Debt Ratio	47.40%
Implied Cost of Debt	3.47%
Cost of Debt (%)	3.95%
Federal Corporate Tax Rate	21.00%
Utility's Blended Tax Rate (%)	30%
Brown Plant Assumed Starting Book-Tax Disparity	50.00%
Excess ADIT as a fraction of Current ADIT	0.00%
Macro Inflation	2.0%
O&M and Fuel Escalator	2.5%
Utility-Owned Wind Metrics:	
Wind Services Value as Percentage of Brown Plant Services Value	85%
Required Generation (MWh)	741,176
Wind Capacity Factor (%)	41%
Assumed Wind Capacity Factor in the Region (%)	41%
Req'd Replacement Wind Capacity (MW)	206
Wind Plant Useful Life (Yrs)	30
Capital Cost of Wind ($/MW)	$1,250,000
Transmission Costs ($/MW)	$0
Total Capital Cost of Utility-Owned Wind ($)	$257,889,544
NPV MACRS (%)	0.83
NPV Wind Generation at Utility ROE Discount Rate (MWh)	6,443,634
Impact of Capital Costs on NPV Revenue Required ($)	$276,644,709
PTC Price ($/MWh)	$20.31
NPV PTC Value ($)	$156,934,724
Impact on NPV Revenue Required of Capital Costs Net PTC ($)	$119,709,986
Wind O&M Expense ($/MWh)	$12.13
Wind PPA Metrics:	
Impact on NPV Revenue Required of Capital Costs Net PTC ($)	$119,709,986
NPV Wind Generation (MWh)	9,187,983
NPV Wind Generation at Utility Shareholder DR (MWh)	6,241,998
Wind PPA Price ($/MWh)	$22.95
Market Value Corrected Wind PPA Price ($/MWh)	$26.87
Wind PPA Assumed WACC	6.33%
Wind PPA Period (Yrs)	25
Post-PPA Period O&M Increase	100%

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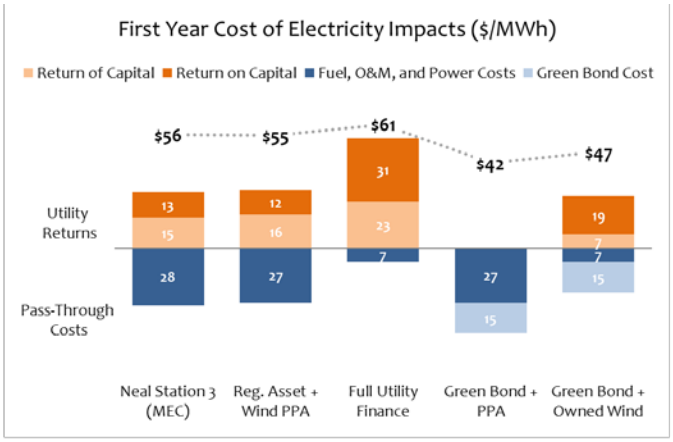
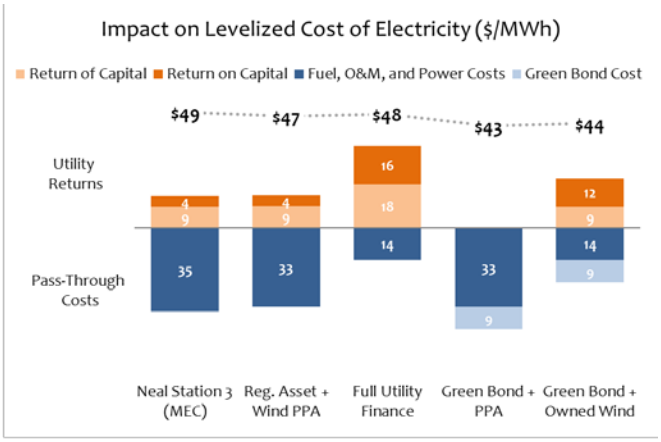
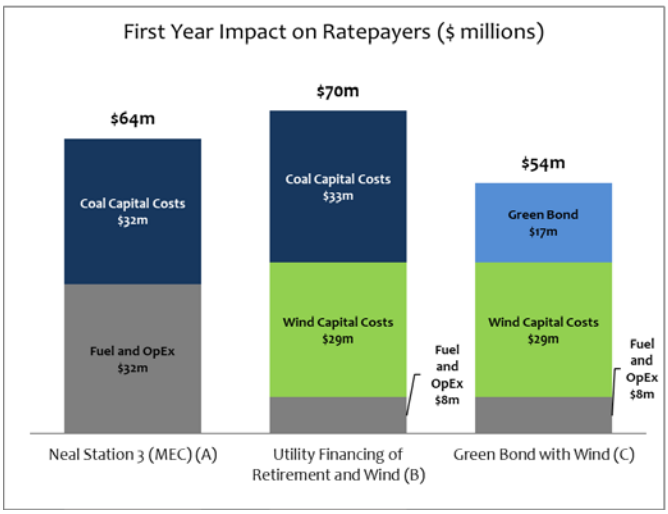
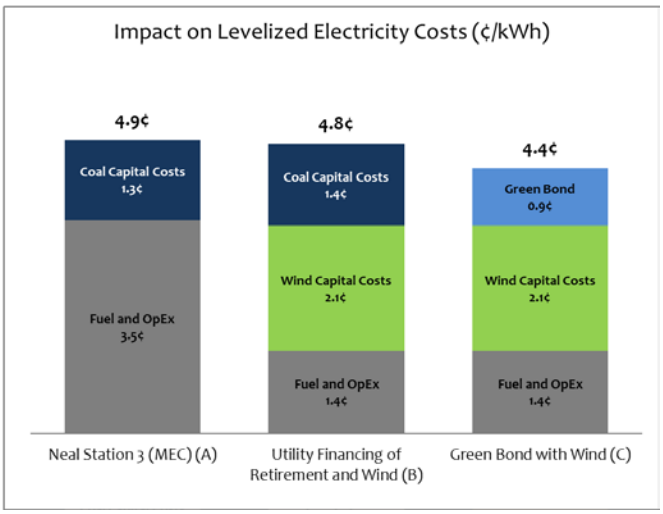

First Year Cost of Electricity Impacts ($/MWh)
Return of Capital
Return on Capital
Fuel, O&M, and Power Costs
Green Bond Cost
$56
$55
$61
$42
$47
Utility Returns
Pass-Through Costs
13
15
28
12
16
27
31
23
7
27
15
19
7
7
15
Neal Station 3 (MEC)
Reg. Asset + Wind PPA
Full Utility Finance
Green Bond + PPA
Green Bond + Owned Wind


Impact on Levelized Cost of Electricity ($/MWh)
Return of Capital
Return on Capital
Fuel, O&M, and Power Costs
Green Bond Cost
$49
$47
$48
$43
$44
Utility Returns
Pass-Through Costs
4
9
35
4
9
33
16
18
14
33
9
12
9
14
9
Neal Station 3 (MEC)
Reg. Asset + Wind PPA
Full Utility Finance
Green Bond + PPA
Green Bond + Owned Wind


First Year Impact on Ratepayers ($ millions)
$64m
Coal Capital Costs $32m
Fuel and OpEx $32m
$70m
Coal Capital Costs $33m
Wind Capital Costs $29m
Fuel and OpEx $8m
$54m
Green Bond $17m
Wind Capital Costs $29m
Fuel and OpEx $8m
Neal Station 3 (MEC) (A)
Utility Financing of Retirement and Wind (B)
Green Bond with Wind (C)


Impact on Levelized Electricity Costs (¢/kWh)
4.9¢
Coal Capital Costs 1.3¢
Fuel and OpEx 3.5¢
4.8¢
Coal Capital Costs 1.4¢
Wind Capital Costs 2.1¢
Fuel and OpEx 1.4¢
4.4¢
Green Bond 0.9¢
Wind Capital Costs 2.1¢
Fuel and OpEx 1.4¢
Neal Station 3 (MEC) (A)
Utility Financing of Retirement and Wind (B)
Green Bond with Wind (C)

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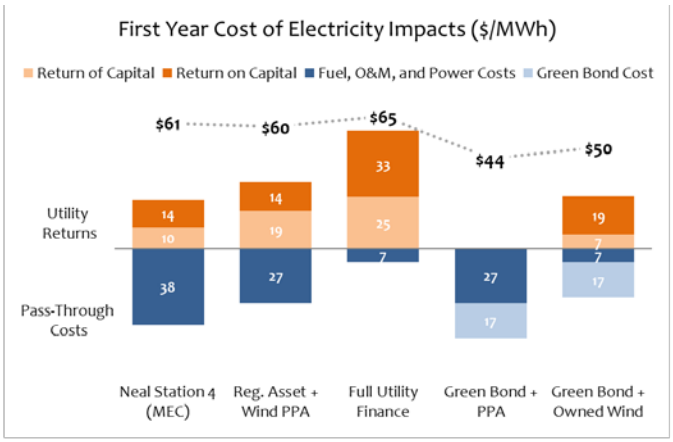
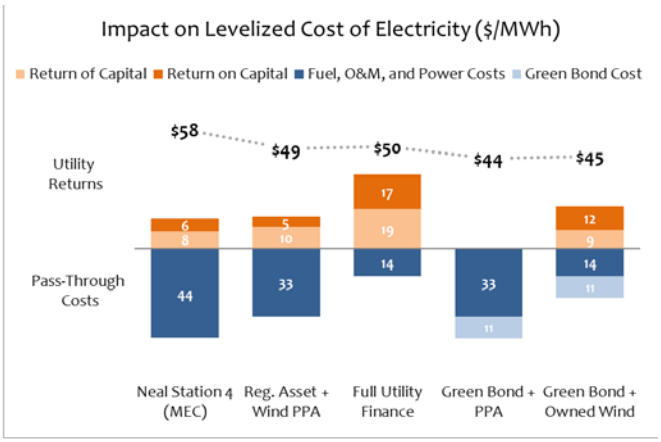
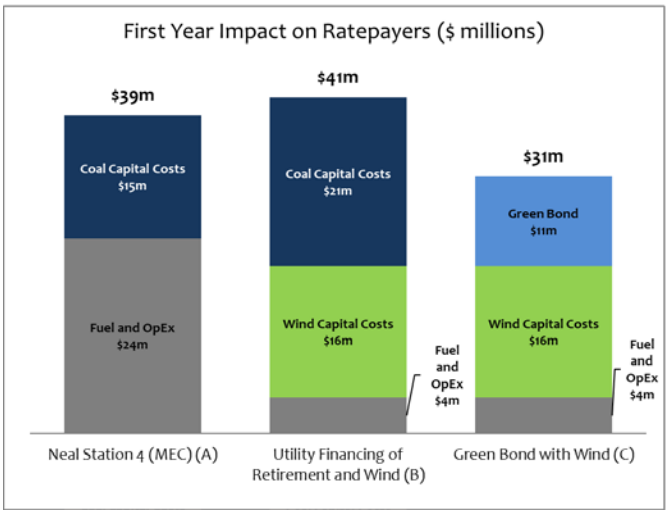
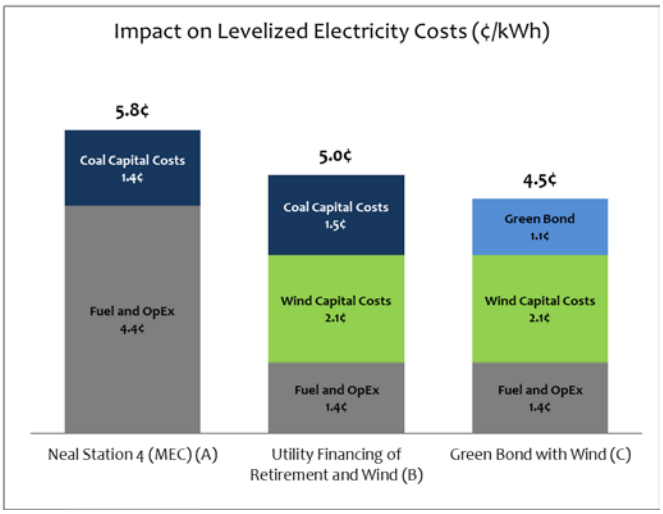

First Year Cost of Electricity Impacts ($/MWh)
Return of Capital
Return on Capital
Fuel, O&M, and Power Costs
Green Bond Cost
$61
$60
$65
$44
$50
Utility Returns
Pass-Through Costs
14
10
38
14
19
27
33
25
7
27
17
19
7
7
17
Neal Station 4 (MEC)
Reg. Asset + Wind PPA
Full Utility Finance
Green Bond + PPA
Green Bond + Owned Wind


Impact on Levelized Cost of Electricity ($/MWh)
Return of Capital
Return on Capital
Fuel, O&M, and Power Costs
Green Bond Cost
$58
$49
$50
$44
$45
Utility Returns
Pass-Through Costs
6
8
44
5
10
33
17
19
14
33
11
12
9
14
11
Neal Station 4 (MEC)
Reg. Asset + Wind PPA
Full Utility Finance
Green Bond + PPA
Green Bond + Owned Wind


First Year Impact on Ratepayers ($ millions)
$39m
Coal Capital Costs $15m
Fuel and OpEx $24m
$41m
Coal Capital Costs $21m
Wind Capital Costs $16m
Fuel and OpEx $4m
$31m
Green Bond $11m
Wind Capital Costs $16m
Fuel and OpEx $4m
Neal Station 4 (MEC) (A)
Utility Financing of Retirement and Wind (B)
Green Bond with Wind (C)


Impact on Levelized Electricity Costs (¢/kWh)
5.8¢
Coal Capital Costs 1.4¢
Fuel and OpEx 4.4¢
5.0¢
Coal Capital Costs 1.5¢
Wind Capital Costs 2.1¢
Fuel and OpEx 1.4¢
4.5¢
Green Bond 1.1¢
Wind Capital Costs 2.1¢
Fuel and OpEx 1.4¢
Neal Station 4 (MEC) (A)
Utility Financing of Retirement and Wind (B)
Green Bond with Wind (C)

AFFADAVIT OF
DAVID B. POSNER

STATE OF CALIFORNIA) ss.
COUNTY OF)
SAN FRANCISCO

I, David B. Posner, being first duly sworn on oath, state that I am the same David B. Posner identified in the testimony being filed with this affidavit, that I have caused the testimony to be prepared and am familiar with its contents, and that the testimony is true and correct to the best of my knowledge and belief as of the date of this affidavit.

/s/ David B. Posner
David B. Posner

State of California
County of San Francisco
Subscribed and sworn before me the 16th day of December, 2020
By David B. Posner

/s/ I. Komarovska
I. Komarovska
Notary Public in and for the State of California