BEFORE THE
ARIZONA CORPORATION COMMISSION

IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR A HEARING TO DETERMINE THE FAIR VALUE OF THE UTILITY PROPERTY OF THE COMPANY FOR RATEMAKING PURPOSES, TO FIX A JUST AND REASONABLE RATE OF RETURN THEREON, TO APPROVE RATE SCHEDULES DESIGNED TO DEVELOP SUCH RETURN.	Docket No. E-01345A-19-0236

Direct Testimony
of
Tyler Comings

REDACTED VERSION

On Behalf of
Sierra Club

October 2, 2020

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I. INTRODUCTION AND QUALIFICATIONS

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

A. My name is Tyler Comings. I am a Senior Researcher at Applied Economics Clinic, located at 1012 Massachusetts Avenue, Arlington, Massachusetts.

Q. Please describe Applied Economics Clinic.

A. The Applied Economics Clinic is a 501(c)(3) non-profit consulting group housed at Tufts University's Global Development and Environment Institute. Founded in February 2017, the Clinic provides expert testimony, analysis, modeling, policy briefs, and reports for public interest groups, including many government entities, on the topics of energy, environment, consumer protection, and equity, while providing on-the-job training to a new generation of technical experts.

Q. Please summarize your work experience and educational background.

A. I have 14 years of experience in economic research and consulting. At Applied Economics Clinic, I focus on energy system planning, costs of regulatory compliance, wholesale electricity markets, utility finance, and economic impact analyses. I have provided testimony on these topics in Colorado, the District of Columbia, Hawaii, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New Mexico, Ohio, Oklahoma, West Virginia, and Nova Scotia (Canada). I am also a Certified Rate of Return Analyst (CRRA) and member of the Society of Utility and Regulatory Financial Analysts (SURFA).

I have provided expertise for many public-interest clients including: American Association of Retired Persons (AARP), Appalachian Regional Commission,

Citizens Action Coalition of Indiana, City of Atlanta, Consumers Union, District of Columbia Office of the People's Counsel, District of Columbia Government, Earthjustice, Energy Future Coalition, Hawaii Division of Consumer Advocacy, Illinois Attorney General, Maryland Office of the People's Counsel, Massachusetts Energy Efficiency Advisory Council, Massachusetts Division of Insurance, Michigan Agency for Energy, Montana Consumer Counsel, Mountain Association for Community Economic Development, Nevada State Office of Energy, New Jersey Division of Rate Counsel, New York State Energy Research and Development, Nova Scotia Utility and Review Board Counsel, Rhode Island Office of Energy Resources, Sierra Club, Southern Environmental Law Center, U.S. Department of Justice, Vermont Department of Public Service, West Virginia Consumer Advocate Division, and Wisconsin Department of Administration.

I was previously employed at Synapse Energy Economics, where I provided expert testimony and reports on coal plant economics and utility system planning. Prior to that, I performed research on consumer finance and behavioral economics at Ideas42 and conducted economic impact and benefit-cost analysis of energy and transportation investments at EDR Group.

I hold a B.A. in Mathematics and Economics from Boston University and an M.A. in Economics from Tufts University.

My full resume is attached as Attachment TC-1.

Q. On whose behalf are you testifying in this case?

A. I am testifying on behalf of Sierra Club.

Q. Have you testified before the Arizona Corporation Commission previously?

A. No.

Q. Have you testified before other public utility commissions in other jurisdictions?

A. Yes. I have testified before commissions in Colorado, the District of Columbia, Hawaii, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New Mexico, Ohio, Oklahoma, West Virginia, and Nova Scotia (Canada).

Q. What is the purpose of your testimony?

A. The focus of my testimony is the request by Arizona Public Service Company (APS or the Company) for recovery of costs associated with two coal units, Four Corners Units 4 and 5. First, I discuss past decision-making on expenditures at these units and how the units' economics have changed over time. Second, I conduct a forward-looking economic assessment of both units. Finally, I recommend how these units' costs should be treated in this case and how future resource planning for units 4 and 5 should be conducted.

Q. Please summarize your findings and recommendations.

A. Based on my analysis of the Company's filing and data responses in this case, I conclude that:

1. **The Company has continually failed to justify the continued operation and investment in Four Corners Units 4 and 5.** Since the Company acquired its current share of ownership of these two units in 2013, the economics of continuing to operate them has markedly worsened. The cost of

[redacted] while the costs of competing resources have decreased. Renewable and storage resource costs have dropped dramatically and are widely expected to continue to decline. Gas prices have remained low, and industry-wide forecasts of future gas prices have decreased dramatically. Despite these trends, since APS acquired its current share in 2013, the Company has failed to evaluate retiring and replacing Four Corners Units 4 and 5 before 2031.

2. **I found that the units are too costly to justify continued operation; therefore, I recommend that they be retired as soon as possible.** I conducted a forward-looking economic assessment of these units—comparing a 2023 retirement to the Company's currently planned 2031 retirement. Relying on the Company's projected costs of the two units through 2031 (including in its 2020 IRP), I find that there would be substantial savings from early retirement across a wide range of assumptions. For instance, using the Company's 2020 IRP base case scenario, I estimate savings between [redacted] Importantly, these savings would occur even if the costs of past expenditures (such as the selective catalytic reduction or "SCR") were allowed into rates. I also accounted for differences in termination costs between the two retirement years—including those at the Navajo Mine. With these substantial savings, the Company should plan to retire the units as soon as possible, issue a competitive solicitation for a wide and robust sample of replacement options, and plan for a just and equitable transition for the affected communities.

3. I recommend that the Commission disallow costs that are unnecessary for the units continued operation and require an early retirement analysis in the 2020 IRP. The Company has failed to justify continued operation of these two units, and I find that there would be substantial customer savings with their earlier retirement. Further expenditures made with a 2031 retirement in-mind are imprudent. Only those costs that are necessary for safe, near-term operation should be allowed in rates at this time. Moreover, the Company's recently released 2020 IRP fails to evaluate retirement of the units prior to 2031. If APS does not decide to retire the units by end-of-year 2023, the Commission should require that the Company evaluate earlier retirement in the 2020 IRP and subsequent IRPs. I am aware that Chairman Burns has requested that APS model accelerated depreciation and securitization for a variety of retirement dates for the Four Corners power plant, including 2023.[1] I may provide responsive testimony evaluating APS's response once it is received.

II. THE COMPANY HAS REPEATEDLY FAILED TO JUSTIFY CONTINUED OPERATION AND INVESTMENT IN FOUR CORNERS UNITS 4 AND 5

Q. Please summarize this section.

A. In this section, I discuss the Company's past planning regarding Four Corners Units 4 and 5, focusing on modeling in the Company's Integrated Resource Plans ("IRPs"). The Company has repeatedly failed to seriously evaluate the units' future even as the

[1] Letter from Chairman Burns, Docket No. E-01345A-19-0236 (Sept. 1, 2020), *available at* https://docket.images.azcc.gov/E000008707.pdf.

[redacted] and other resource options became more cost competitive. The Company has had several opportunities to re-assess earlier retirement of these units, including prior to making a major investment in SCR pollution controls for the units.

Q. Please describe Four Corners Units 4 and 5.

A. Four Corners Units 4 and 5 are two 770 MW coal-fired units (1,540 MW total) located near Farmington, New Mexico, which began operation in 1969 and 1970, respectively.[2] APS currently owns 63 percent of these two units, totaling 970 MW of capacity for the Company.[3] The Company previously owned 15 percent of the units but purchased another 48 percent share from Southern California Edison ("SCE") in 2013. The remaining shares of the units are co-owned by Public Service of New Mexico (13 percent), Salt River Project (10 percent), Tucson Electric Power (7 percent), and Navajo Transitional Energy Company (7 percent).[4] The source of fuel for the units is the Navajo Mine owned by Navajo Transitional Energy Company (NTEC), located near the two units in northwestern New Mexico. NTEC has a contract to provide coal for the units through 2031.[5]

[2] Ariz. Pub. Serv., *2020 Integrated Resource Plan* at 52 (June 26, 2020), *available at* https://docket.images.azcc.gov/E000007312.pdf [hereinafter "2020 IRP"].
[3] *Id.*
[4] *See* Salt River Project, *Four Corners Power Plant,* https://www.srpnet.com/about/stations/fourcorners.aspx (last visited July 27, 2020).
[5] Ariz. Pub. Serv. Application at 163, Schedule E-9, Docket No. E-01345A-19-0236 (Nov. 11, 2019), *available at* https://docket.images.azcc.gov/E000003517.pdf.

Q. How long is the Company planning to continue operating these units?

A. The Company is currently planning to retire Four Corners Units 4 and 5 in 2031, coinciding with the end of the coal contract with NTEC. The Company had previously planned to operate the units until 2038, and the depreciation period in this case remains through 2038.[6] However, APS announced in January of this year that it was ceasing all coal operations at Four Corners in 2031.[7]

Q. Are plans for the units' future operations relevant to this current rate case?

A. Yes. The Company is requesting approval to charge customers for hundreds of millions of dollars in test-year and post-test year capital and operating costs associated with the two units in this case, while assuming that they will operate until 2031.[8] Whether these units should be operating through 2031 is germane to the prudence of continued expenditures at these units, and whether recovery of such spending (and associated rate of return) from ratepayers should be allowed. For instance, spending on all currently planned capital and maintenance may no longer be necessary or cost-effective. Put differently, some spending might be "avoidable" if units were retired earlier than 2031. Including this "avoidable" spending in rates

[6] Direct Testimony of Elizabeth A. Blankenship at 30:4-5 [hereinafter "Blankenship Direct"].

[7] Press Release, Ariz. Pub. Serv., *APS sets course for 100 percent clean energy future* (Jan. 22, 2020), *available at* https://www.aps.com/en/About/Our-Company/Newsroom/Articles/APS-sets-course-for-100-percent-clean-energy-future.

[8] For Four Corners 4 and 5 specifically, Exhibit BDL-4DR includes $10.1 million in "total projected costs"; Exhibit BDL-5DR includes $58.9 million in "total projected costs." For the adjusted test year, the Company is including $187.5 million in fuel expense and $101.9 million in non-fuel operations and maintenance. *See* APS Response to SC DR 1.17. All public discovery responses referenced in this testimony are compiled and available within Attachment TC-2 ["Attach. TC-2"].

now would prevent ratepayers from realizing this savings should the units retire before 2031.

Q. Please describe the history of APS's investments in Four Corners Units 4 and 5.

A. Below is a timeline of events relevant to the Company's current ownership of the two units:

- November 2010: The Company applies for Commission approval to purchase SCE's 48 percent share in Four Corners Units 4 and 5.[9]
- March 2012: The Company releases its 2012 IRP which considers portfolios with and without the acquisition.[10]
- April 2012: The Commission rules that the Company should delay the SCE transaction in "order to minimize the rate impact to customers…".[11] However, the Commission does not rule on the prudence of the transaction.[12]
- December 2013: The Company finalizes its purchase of SCE's 48 percent share in the two units, increasing APS's ownership share to 63 percent.[13]

[9] Ariz. Pub. Serv. Application, Docket No. E-01345A-10-0474, (Ariz. Corp. Comm'n Nov. 22, 2010), *available at* https://docket.images.azcc.gov/0000120291.pdf.
[10] Ariz. Pub. Serv., *2012 Integrated Resource Plan* at 44 (Dec. 11, 2012), *available at* https://docket.images.azcc.gov/0000135557.pdf [hereinafter "2012 IRP"].
[11] Decision No. 73130 at 43:8-9, Docket No. E-01345A-10-0474 (Ariz. Corp. Comm'n Apr. 24, 2012).
[12] *Id*. at 42.
[13] Ariz. Pub. Serv., *2014 Integrated Resource Plan* at 12 (Dec. 19, 2014), *available at* https://docket.images.azcc.gov/0000152210.pdf [hereinafter "2014 IRP"].

The co-owners of the units sign a coal contract with the Navajo mine for 2016 through 2031.[14]

- April 2014: The Company releases its 2014 IRP where all portfolios assume that the two units operate through 2038.[15]
- December 2014: The Commission rules that APS's acquisition of SCE's share is prudent and allows acquisition costs to be included in rates.[16]
- August-September 2015: The Company signs the contract for the installation of SCR pollution controls and commences construction at the two units.[17]
- April 2017: The Company releases its 2017 IRP, which considers one portfolio where the two units retire in 2031. In the other six portfolios—including APS's preferred portfolio—the units are retired in 2038.[18]
- April 2018: SCRs are operational at the two units for a final cost of $625 million.[19] The Company requests that its share of these SCR costs be included in rates.[20]
- November 2018: Administrative Law Judge (ALJ) recommends that the SCRs installation projects were completed in a "prudent manner" and that

[14] Katherine Locke, *Navajo Energy Company buys coal mine*, NAVAJO-HOPI OBSERVER, Jan. 7, 2014, *available at* https://www.nhonews.com/news/2014/jan/07/navajo-energy-company-buys-coal-mine/.
[15] 2014 IRP at 55, 231.
[16] Decision No. 74876 at 46:13-15, Docket No. E-01345A-11-0224 (Ariz. Corp. Comm'n Dec. 23, 2014).
[17] Attach. TC-2, APS Response to Sierra Club DR 1.27(e)(i).
[18] Ariz. Pub. Serv., *2017 Integrated Resource Plan* at 13, 259 (Apr. 2017), *available at* https://docket.images.azcc.gov/0000168766.pdf [hereinafter "2017 IRP"].
[19] Recommended Opinion and Order from the Hearing Division at 6:15-18, 22:6-7, Docket No. E-01345A-16-0036 (Ariz. Corp. Comm'n Nov. 27, 2018), *available at* https://docket.images.azcc.gov/0000193887.pdf [hereinafter "ALJ Recommendation"].
[20] Direct Testimony of Barbara D. Lockwood at 8:5-8.

APS's share of $383 million should be included in rate base.[21] (As of this writing, the Commission has yet to rule on the prudence of the SCRs.)

- January 2020: The Company decides to retire Four Corners Units 4 and 5 in 2031.[22]

Q. Are you recommending disallowances related to the Company's past decisions and investments in Four Corners Units 4 and 5?

A. No. My recommendations are related to future costs at the units, which I discuss in more detail below. But it is important to review the Company's past decision-making to provide context for future decisions surrounding these two coal units. While I do not provide a recommendation on disallowances for past investments—such as the SCR costs—that should not be taken as recommending that the Commission find those decisions prudent.

Q. Has the Company considered retiring the units prior to 2031 since it acquired its current share of ownership?

A. No. Since APS acquired its current 63 percent share in 2013, the one notable change in the Company's decision making was for these units to retire in 2031 rather than 2038. However, APS has not considered retirement before 2031 in any of its planning following the 2013 acquisition, as I discuss below.

[21] ALJ Recommendation at 10:3-5, 22:6-7.
[22] *See supra* note 7.

A. Following the Acquisition of Four Corners Units 4 and 5, Gas Price Forecasts Increasingly Made Coal Generation Less Competitive

Q. Did the Company consider not acquiring its current share in these units?

A. Yes. In the 2012 IRP, the Company had not yet finalized the purchase of the 48 percent share in Four Corners Units 4 and 5 from SCE. APS modeled four portfolios: two portfolios did not include the SCE acquisition ("Coal Retirement" and "Four Corners Contingency"); and two portfolios assumed the SCE acquisition was finalized ("Base Case" and "Enhanced Renewable").[23] The latter two portfolios—including the Company's preferred portfolio ("Base Case")—assumed the acquisition would be finalized and that Four Corners Units 4 and 5 would operate until 2038.[24] The Base Case was found to be the lowest-cost of these four portfolios under the Company's base gas price forecast.

Q. In the 2012 IRP, what were the Company's findings under a low gas price future?

A. APS's 2012 IRP found that not acquiring the two units would have provided substantial savings if gas prices remained low. Using APS's low gas price forecast, the "Four Corners Contingency" portfolio, where the Company did not acquire Four Corners Units 4 and 5, was found to save $497 million net present value (NPV) over a 30-year period (2012-2041) or save $230 million over a 16-year period (2012-2027), compared to the Base Case portfolio that included the acquisition.[25]

[23] 2012 IRP at 52.
[24] *Id.* at ATT-23.
[25] *Id.* at ATT-95. All portfolios assumed the retirement of Four Corners Units 1-3. *See id.* at 139-140.

Thus, there was substantial savings from not acquiring the units in a low gas price future. Moreover, the APS low gas price forecast would be considered far too high by the industry today: The 2012 IRP low gas price forecast for 2019 was $4.68 per MMBtu—almost double the actual 2019 Henry Hub price of $2.56 per MMBtu.[26]

Q. How do low gas prices affect the economics of coal generation?

A. Low natural gas prices are detrimental to coal generation in two critical ways: 1) lower gas prices lead to lower wholesale market electricity prices, making market purchases more attractive relative to the costs of coal generation; and 2) operating natural gas generation becomes more competitive with a lower fuel cost, thus it is more likely to displace coal generation. It is, therefore, not surprising that the Company's low gas price outlook in the 2012 IRP disfavored the Four Corners Units 4 and 5 acquisition. In its 2012 IRP, the Company stated that "natural gas prices exerted the largest impact on the portfolio results of all of the sensitivities analyzed by APS."[27]

Q. How has the Company's outlook of gas prices changed since its 2012 IRP?

A. The Company's forecasts of natural gas prices (shown in Figure 1) have mostly shifted downward since the 2012 IRP and since the Company finalized the acquisition. For instance, the first six years of the Company's 2014 IRP base case forecast closely resembles the 2012 IRP low gas forecast, where the Company had found that passing on the acquisition would save ratepayers substantially.[28]

[26] 2012 IRP at ATT-30, 48-49.
[27] *Id.* at 61.
[28] *Id.* at ATT-30, 48-49; 2014 IRP at 246.

Subsequent to the 2014 IRP, the Company's forecasts of natural gas prices [redacted]

[redacted]

[redacted]

Figure 1: APS Natural Gas Price Forecasts ($/MMbtu) CONFIDENTIAL[29]

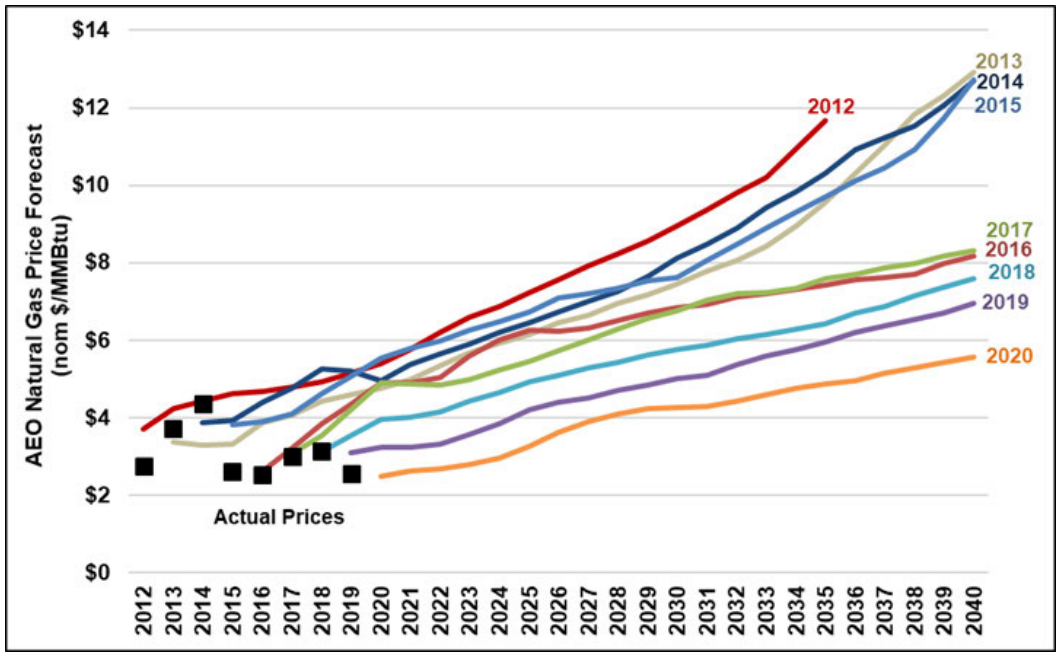
Q. Have industry-wide gas price expectations lowered since 2012?

A. Yes. Since 2012, natural gas price expectations throughout the industry have declined dramatically. Actual gas prices have remained low, especially since 2015, showing that previous predictions overestimated prices. Figure 2 below shows the

[29] 2012 IRP at ATT-30, 137; 2014 IRP at 58, 246; Confidential Attachment "SC 1.23_APS19RC00718_APS 2017 IRP_CONF" at 143, 294 (provided as an attachment to APS Response to SC DR 1.23); Confidential Attachment "SC1.22_ExcelAPS19RC00773_Fuel and Market Price Forecasts_CONF" (referred to in APS Supplemental Response to SC DR 1.22). All confidential discovery responses referenced in this testimony are compiled and available within Attachment TC-3 ["Attach. TC-3"].

Energy Information Administration's (EIA) Annual Energy Outlook (AEO) forecasts since 2012 for Henry Hub natural gas prices along with actual Henry Hub prices.[30]

Figure 2: Annual Energy Outlook (AEO) Natural Gas Price Forecasts ($/MMbtu)[31]



Q. Did the Company re-assess the retirement of Four Corners Units 4 and 5 in its 2014 IRP?

A. No. Such a dramatic change in natural gas price expectations should have led the Company to re-evaluate the units' future. Yet despite the drop in gas price expectations (see Figure 2) which disfavored coal generation, all of its 2014 IRP

[30] Henry Hub is a commonly-used natural gas price point, located in Louisiana.
[31] U.S. Dep't of Energy, *Annual Energy Outlook 2020: Table 1*, https://www.eia.gov/outlooks/aeo/data/browser/ (last visited July 29, 2020).

portfolios continued to assume that Four Corners Units 4 and 5 would operate until 2038.[32]

B. The Need to Spend More Than $600 Million at Units 4 and 5 Should Have Forced the Company to Reconsider Retirement

Q. Please explain the SCR expenditure related to Four Corners Units 4 and 5.

A. APS and the co-owners were facing a legal requirement to substantially reduce nitrogen oxide (NOx) emissions at Four Corners Units 4 and 5 by July 31, 2018.[33] But the SCR retrofits that achieved such reductions were estimated to cost $635 million ultimately costing $625 million (or $385 million for APS's share).[34] This was a substantial investment in an aging coal plant: APS's share of the SCRs cost was more than $130 million higher than the cost of buying SCE's 48 percent ownership share in the units.[35]

The construction of the SCRs did not begin until September 2015. Around that time, the industry's natural gas price expectations had also dropped again (*see* Figure 2, [redacted] Either one of these factors should have led APS to re-evaluate the units' future. Instead, facing both a major expenditure and lower gas price expectations

[32] 2014 IRP at 55, 231.
[33] ALJ Recommendation at 6:12-18.
[34] *Id.* at 9:16-18.
[35] Decision No. 74876 at 43, Docket No. E-01345A-11-0224 (Ariz. Corp. Comm'n Dec. 23, 2014), *available at* https://docket.images.azcc.gov/0000159386.pdf.
[36] Attach. TC-3, Confidential Attachment "SC 1.22_ExcelAPS19RC00773_Fuel and Market Price Forecasts CONF" (referred to in APS Supplemental Response to SC DR 1.22). [redacted] *Id.* at tab "2015".

from the industry, the Company failed to re-evaluate the decision to spend more than $600 million at the plant.

Q. Leading up to the more than $600 million spending on SCRs at the units, did the Company re-evaluate this major investment compared to retiring the units?

A. No. The Company stated that it did not conduct "any forward-looking economic analysis of either or both of Four Corners Units 4 and 5 since the SCR project began in early 2014."[37] Faced with a major investment at a generating unit, prudent planning requires that owner(s) to consider whether the investment is cost-effective relative to other options—such as retiring the units. Indeed, many coal generators have retired or converted to gas in the past decade in lieu of making major investments.[38]

Q. Does the Company claim to be responsible for re-evaluating the SCR decision?

A. No. The Company appears to believe that the issue of the SCR investment is settled. It claims that the prudence of the SCRs was decided by the Commission when it

[37] Attach. TC-2, APS Supplemental Response to Sierra Club DR 1.26(c).
[38] *See, e.g.*, U.S. EPA, Response to Muskogee Letter (Feb. 5, 2019) *available at* https://www.epa.gov/sites/production/files/2019-02/documents/muskogee_generating_station_petition_response_final_2-5-19.pdf) (regarding Muskogee Units 4 and 5 in Oklahoma in 2019); Press Release, Brandon Davis-Handy, Indianapolis Power & Light Company, *IPL Receives Approval for Plans to Stop Burning Coal at Hardin Street Station Unit #*7 (July 29, 2015), *available at* https://www.iplpower.com/About_IPL/Newsroom/News_archives/2015/IPL_receives_approval_for_plans_to_stop_burning_coal_at_Harding_Street_Station_Unit__7/ (regarding Harding Street Unit 7 in Indiana in 2016); *AEP to Retire Big Sandy Coal-fired Unit 2*, Power Engineering, Dec 19, 2012, *available at* https://www.power-eng.com/2012/12/19/aep-to-retire-big-sandy-coal-fired-unit-2/ (regarding Big Sandy Unit 2 in Kentucky in 2015).

approved the SCE acquisition in December of 2014.[39] It also cited to the ALJ's finding that the SCRs were "completed in a reasonable, cost-efficient, and prudent manner."[40]

Q. Do you agree that the prudency of the SCRs has been decided?

A. No. The Commission has not issued an order on the prudence of the SCR costs, and those costs are currently not included in rates. But even if the investments were deemed prudent by the Commission in 2014, that did not remove the Company's obligation to re-evaluate the decision with up-to-date facts on the ground—and it does not obviate the need for continued evaluation of the units' future today.

Q. Was one of the co-owners' spending on the SCRs at Four Corners 4 and 5 found to be imprudent?

A. Yes. The New Mexico Public Regulation Commission (NMPRC) disallowed the Public Service Company of New Mexico's (PNM) rate of return on the SCR and other capital costs.[41] The NMPRC found "that PNM's imprudence extended not just to the decision to install SCR and make additional investments in FCPP [Four Corners Power Plant], but to PNM's determination that continued use of FCPP as base load generation was necessary."[42] The NMPRC concluded that PNM's analysis:

[39] Attach. TC-2, APS Supplemental Response to Sierra Club DR 1.26(a).
[40] *Id.*
[41] Order Partially Adopting Certification of Stipulation at 20, Docket No. 16-00276-UT (N.M. Public Reg. Comm'n Dec. 20, 2017), *available at* https://edocket.nmprc.state.nm.us/AspSoft/HandlerDocument.ashx?document_id=1164794.
[42] *Id.*

> …omitted at a minimum intervening changes in the market prices for alternatives such as gas, solar and wind. PNM also ignored other developments during this period that would have triggered a prudent utility to update and review its prior analysis, including the withdrawal of FCPP co-owner E1 Paso Electric Company (EPE) from participation at FCPP announced in November 2013, an increase in the cost estimates for the SCR project as well as a significant decline in the performance of FCPP as evidenced in a significant rise in the forced outage rate that prompted concerns by other FCPP co-owners.[43]

As a result of finding imprudence, the NMPRC discussed the possibility of further disallowances in a later rate case, concluding that only disallowing the rate of return on (but not the "return of" or depreciation) the SCR expenditure may be insufficient. The Commission referred to this as a "limited remedy" and that the "propriety of additional disallowances should be addressed" in a future docket.[44] Thus, the NMPRC made it clear that the issue of imprudence of the SCR investment, and additional expenditures related to the continued operations of the two units, is not resolved. (As of this writing, PNM has not filed a subsequent rate case.)

Q. Did APS reevaluate the SCR investment once construction had started?

A. No.

Q. Once construction of a major project has already started, does that obviate the utility's responsibility to evaluate its cost-effectiveness?

A. No. The Company had a continuing obligation to re-assess these major investments even after construction was underway. Merchant operators commonly evaluate

[43] *Id.* at 16-17.
[44] *Id.* at 20.

investments on a forward-going basis to re-assess their assets' future. For instance, in 2015, Dynegy, then the owner of the Newton coal plant in Illinois, planned to install an FGD (flue gas desulfurization) at the plant for $186 million to be completed in 2019.[45] However, Dynegy stopped the project in September 2016 and decided to retire one of the units, after it had already spent $148 million on the FGD.[46] Thus, the owner decided that abandoning the FGD project, even though most of the budget had been spent, was the best option for the company and its shareholders. Similarly, a regulated utility like APS has a continuing obligation to pursue low-cost, low-risk planning for its ratepayers. This obligation does not cease once a construction project is underway.

Q. In the 2017 IRP, did the Company assess retirement of Four Corners Units 4 and 5 in 2031 instead of 2038?

A. Yes. The 2017 IRP included one portfolio ("Carbon Reduction") that assumed that the units retired in 2031; the other six portfolios assumed that the units would retire in 2038.[47] The one portfolio that assumed 2031 retirement was the lowest cost but was not selected as the Company's preferred plan.[48]

[45] Dynegy Inc., 2016 Annual Report (Form 10-K) at F-40 (Feb. 25, 2016), a*vailable at* https://www.sec.gov/Archives/edgar/data/1379895/000137989516000022/dyn-20151231_10k.htm.
[46] Dynegy Inc., 2017 Annual Report (Form 10-K) at 61 (Feb. 24, 2017), *available at* http://www.annualreports.com/HostedData/AnnualReports/PDF/NYSE_DYN_2016.pdf.
[47] 2017 IRP at 13, 259.
[48] *Id*. at 14.

Q. Did the Company's projections of the units' costs and performance change significantly in the 2017 IRP compared to past IRPs?

A. Yes. The Company projected an [redacted] in the costs of owning and operating the units, along with a [redacted] in the units' future generation, and [redacted] [49] Despite this [redacted] outlook, the Company still chose a portfolio where the units operated until 2038 and failed to assess any portfolio where they were retired prior to 2031.

To understand this change in the units' outlook over time, I compared the cost and production outlooks presented for the units in APS's 2012, 2014, and 2017 IRPs. For example, APS's projected costs per MWh [redacted] between the 2014 and the 2017 IRPs—shown in Figure 3. Excluding carbon costs, the levelized costs of the units [redacted] between the 2014 and 2017 IRPs. (The levelized cost of carbon [redacted] in both IRPs). The breakdown of the units' costs as projected in the 2012, 2014 and 2017 IRPs is shown in Figure 3 below. For comparison purposes, and relying on APS's own projections, I have calculated the costs of the units across the same time-period (2017 through 2038) and using the same cost measure (levelized costs in 2017 dollars).[50]

[49] Highly Confidential Attachment "SC 1.15_ExcelAPS19RC00883_Generating Unit EAF 2010-2019_HIGHLY CONF" (referred to in APS Supplemental Response to SC DR 1.15(f)). All highly confidential discovery responses referenced in this testimony are compiled and available within Attachment TC-4 ["Attach. TC-4"].

[50] I relied on the following sources from APS: Attach. TC-3, Confidential Attachment "SC 2.1_ExcelAPS19RC01244_12IRP FC Rev Req_CONF" (referred to in APS Supplemental Response to SC DR 2.1(b)); Attach. TC-3, Confidential Attachment "2.1_ExcelAPS19RC01247_14IRP FC Rev Req_CONF" (referred to in APS Supplemental Response to SC 2.1(b)); Attach. TC-3, Confidential Attachment "SC 2.1_ExcelAPS19RC01250_17IRP FC Rev Req_CONF" (referred to in APS Supplemental Response to SC DR 2.1(b)). To calculate the levelized costs, I also used the 2017 IRP

Figure 3: Levelized Costs of Four Corners Units 4 and 5 CONFIDENTIAL ($2017/MWh, 2017-2038)[51]

The [redacted] in levelized costs is in part due to the Company projecting that the units will [redacted]. A [redacted] in generation means that the costs per MWh will [redacted] all else equal, because the same fixed costs will be spread across [redacted] MWh. For 2017 through 2038, the Company projected an average capacity factor of [redacted] in the 2017 IRP, compared to [redacted] in the 2014 IRP. The change in generation was likely due to lower natural gas price expectations (see Figure 2), and because the units would be [redacted] than previously expected. The projected forced outage rate from 2017 through 2019 [redacted] was on average [redacted] in the 2014 IRP.[52]

discount rate of 7.5% (2017 IRP at 163) and the projections of Four Corners 4 and 5 generation from the Company's preferred portfolio in each IRP.

[51] *Id.*

[52] Attach. TC-3, Confidential Attachment "SC 1.21_ExcelAPS19RC01064_Forecasts for 2012,2014,2016_CONF" at 3 (referred to in APS Supplemental Response to SC DR 1.21).

It is clear that the Company's outlook for the units' performance markedly changed at the time of the 2017 IRP analysis. The units were projected to be [redacted]. Yet the Company failed to consider whether there were lower-cost solutions for ratepayers, like shutting these units down before 2031.

C. Even After a Major Investment Was Completed, Continued Operation of the Units Should Have Been Tested Against Competitively Priced Renewables and Storage Resources

Q. Is it possible that the units were not economic in 2018, after the SCRs were completed?

A. Yes. Although the SCRs were completed, and $625 million had been spent (by all owners) when it requested the SCR rate adjustment in April 2018, the Company could still have re-evaluated the units' long-term future. A forward-looking analysis, looking only at future spending at the units, may have shown that options other than continued operation were less expensive. In other words, re-evaluating the economics in 2018 would have enabled APS to determine whether—in light of dramatic changes in the electricity industry, such as falling gas price forecasts and renewable energy costs—ratepayers would save money by APS shutting down the units, even assuming that ratepayers were required to pay for the return of and on all of APS's preceding expenditures.

Other companies have routinely re-evaluated continued operation of coal units, even following a major capital expenditure. For example, in 2016, PNM (a co-

Forecasts were provided for September 2011, 2013, and 2016; the Company claims these are the same vintage as the 2012, 2014, 2017 IRP analyses, respectively. Attach. TC-2, APS Supplemental Response to SC DR 1.21(m).

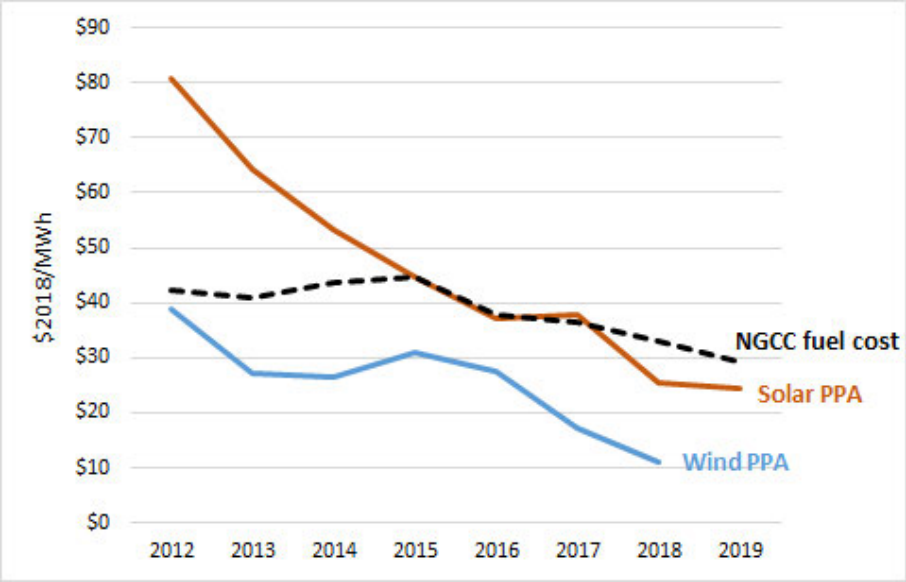
owner of Four Corners) completed the installation of selective non-catalytic reduction (SNCR) and balanced draft technology (BDT) at the San Juan coal plant, costing $78 million.[53] Soon after completing that project, in its 2017 IRP, PNM estimated savings would result from retiring San Juan in 2022 and pursuing natural gas and renewable resources instead.[54] In its filing for approval of replacement resources, PNM concluded that, for San Juan, "there is no economic or practical way for the plant to continue to serve PNM customers past 2022."[55] And as I explained previously, the NMPRC—after disallowing some of PNM's spending on Four Corners' SCRs—discussed the possibility of further prudence disallowances.

Q. Have the costs of renewable resources decreased dramatically in recent years?

A. Yes, particularly for solar photovoltaic (PV) installations. The Lawrence Berkeley National Laboratory ("LBNL") tracks power purchase agreements ("PPAs") for renewable resources across the U.S. In 2019, it found that the generation-weighted average cost of actual solar PV PPAs was $24.40 per MWh in 2019, compared to $80.90 in 2012. Shown below in Figure 4, the study compared the cost of wind and solar PPAs to the 20-year forward, levelized costs of <u>fuel only</u> for a natural gas combined cycle (NGCC) unit.

[53] PNM Resources Inc., 2016 Annual Report (10K Form) at B-87 (Feb. 28, 2017) *available at* https://otp.tools.investis.com/clients/us/pnm_resources/SEC/sec-show.aspx?Type=html&FilingId=11891412&CIK=0001108426&Index=10000.
[54] Direct Testimony of Thomas G. Fallgren at 31-21, Docket No. No. 19-00195-UT (N.M. Public Reg. Comm'n July 1, 2019), *available at* https://edocket.nmprc.state.nm.us/AspSoft/HandlerDocument.ashx?document_id=1179829.
[55] *Id*. at 32:13-14.

Figure 4: LBNL Levelized PV and Wind PPA Prices and Levelized Natural Gas Price Projections ($2018/MWh)[56]



This data shows solar PV as on par with NGCC fuel cost expectations for 2015 through 2017. But in 2018 and 2019, solar PV PPAs were less expensive than forward-going natural gas fuel alone. The same study also shows sharp decreases in solar/battery storage hybrid projects.[57]

Q. Have utilities that recently issued all-resource solicitations found that pursuing renewables and/or storage is lower cost than continuing to operate coal?

A. Yes. In nearby states, utilities have issued all-resource requests for proposal ("RFPs") and found that investing mostly in new renewables and storage is preferred to continued coal operations. Below are two examples:

[56] Mark Bolinger, Joachim Seel & Dana Robson, *Utility-Scale Solar: Empirical Trends in Project Technology, Cost, Performance, and PPA Pricing in the United States –2019 Edition* at 45, Lawrence Berkeley National Laboratory (LBNL) (Dec. 2019), *available at* https://emp.lbl.gov/utility-scale-solar/ (recreated from Excel data provided by the authors).
[57] *Id*. at 42.

First, as mentioned above, in its 2017 IRP, PNM found that retirement of the San Juan coal plant was cheaper than continuing the plant's operations. After this finding, PNM issued an all-source RFP in October 2017 and a subsequent storage-only RFP in April 2019.[58] The all-source RFP resulted in 345 bids, most of which were not made public. However, PNM reported bid prices for two solar/battery hybrid projects: 1) the Arroyo project included 300 MW of solar at $18.65 per MWh paired with 40 MW of battery storage at $7.46 per kW-month capacity charge; and 2) the Jicarilla project included 50 MW of solar at $19.73 per MWh paired with a 20 MW battery at $9.97 per kW-month capacity charge.[59] In total (including those two projects), PNM chose a replacement portfolio that included 350 MW of solar, 130 MW of battery storage, and 280 MW of natural gas.[60] But instead of adopting PNM's portfolio, the Commission approved the "CCAE 1" portfolio—which I and others supported in testimony in that case—which ultimately included 650 MW of solar, 300 MW of battery storage, and no new gas generation.[61]

[58] Direct Testimony of Roger W. Nagel at 13, Docket No. No. 19-00195-UT (N.M. Pub. Reg. Comm'n July 1, 2019), *available at* https://edocket.nmprc.state.nm.us/AspSoft/HandlerDocument.ashx?document_id=1179834.
[59] PNM Consolidated Application for the Abandonment, Financing and Replacement of the San Juan Generating Station Pursuant to the Energy Transition Act at 16, Docket No. 19-00195-UT (N.M. Pub. Reg. Comm'n July 1, 2019), *available at* https://edocket.nmprc.state.nm.us/AspSoft/HandlerDocument.ashx?document_id=1179824.
[60] *Id*. at 6-7.
[61] Order on Recommended Decision on Replacement Resources – Part II at 15, Docket No. 19-00195-UT, (N.M. Pub. Reg. Comm'n July 29, 2020), *available at* https://edocket.nmprc.state.nm.us/AspSoft/HandlerDocument.ashx?document_id=1191982.

Second, Xcel Colorado issued an all-resource RFP in 2017. Xcel's modeling showed that retiring two coal units early, Comanche 1 and 2 in 2022 and 2025 (respectively), and replacing them with mostly wind, solar and gas combustion turbines was lower-cost than continuing the coal units' operations and replacing them later.[62] The utility received 430 bids, over 350 of which were for renewable energy or storage.[63] The results for standalone and combinations of wind, solar and battery resources, showed median bid prices of between $18 and $36 per MWh depending on the type.[64] (Note that because these were median values that half of the bids for each resource type were cheaper, by definition.) The utility ultimately chose a portfolio that included early retirement of the two coal units, and the addition of 1,131 MW of wind, 707 MW of solar, 275 MW of battery and 383 MW of gas.[65]

These examples show how cost-competitive renewable and storage resources have been in recent years compared to both coal and natural gas. Both PNM and Xcel sought a competitive, robust sample of bids and both ultimately advocated early coal retirement combined with mostly renewable and storage replacement resources. Inexplicably, APS has declined to take advantage of the broad, low-cost

[62] Rebuttal Testimony and Attachments of James F. Hill at 38, Table JFH-12, Docket No. 16A-0396E (Colo. Pub. Utility Comm'n Jan. 29, 2018), *available at* https://www.dora.state.co.us/pls/efi/EFI.Show_Filing?p_session_id=&p_fil=G_740936.
[63] Xcel Energy Colorado, 2017 All Source Solicitation: 30-Day Report at 3, Docket No. 16A-0396E (Colo. Pub. Utility Comm'n Dec. 28, 2017), *available at* https://assets.documentcloud.org/documents/4340162/Xcel-Solicitation-Report.pdf.
[64] *Id*. at 9.
[65] Xcel Energy Colorado, Electric Resource Plan: 120-Day Report at 15, Docket No. 16A-0396E (Colo. Pub. Utility Comm'n June 6, 2018), *available at* https://www.powermag.com/wp-content/uploads/2018/06/xcel-2018-clean-energy-plan.pdf.

market of renewable and storage resources that could cost-effectively replace Four Corners Units 4 and 5 prior to 2031, to the detriment of Arizona ratepayers.

Q. Since it acquired SCE's share in 2013, has APS tested the economics of retiring Four Corners Units 4 and 5 prior to 2031?

A. No. As noted, APS did not incorporate any pre-2038 retirement scenarios in its 2014 IRP. It incorporated one 2031-retirement portfolio into its 2017 IRP, but it did not evaluate a pre-2031 retirement portfolio.[66] APS also failed to present a pre-2031 retirement portfolio in its 2020 IRP.[67]

Q. Please summarize the Company's past resource planning regarding Four Corners Units 4 and 5.

A. Prudent resource planning requires the competition of existing resources along with new, available resource options. If existing resources are not periodically tested against new resource options and ever-changing market conditions, then the utility is failing to prudently manage its units' operations. Since APS acquired SCE's share of ownership in the coal units, natural gas price expectations have decreased, the [redacted], and the costs of renewable and storage resources have sharply declined. Despite conditions that have increasingly disfavored coal operations, the Company has consistently prevented Four Corners Units 4 and 5 to compete under competitive conditions. APS has instead opted to insulate these two coal units from competition, continuing

[66] Attach. TC-2, APS Supplemental Response to SC DR 1.12(a).
[67] *Id.* at APS Supplemental Response to SC DR 1.12(b); 2020 IRP at 18.

investment in the units under a 2031 retirement, and asking for recovery of these costs from ratepayers.

III. FOUR CORNERS UNITS 4 AND 5 WILL CONTINUE TO COST RATEPAYERS SUBSTANTIALLY AND SHOULD BE RETIRED AS SOON AS POSSIBLE

Q. Please summarize your assessment of the going forward costs of Four Corners Units 4 and 5.

A. In this section, I explain my forward-looking economic assessment of the units, comparing retiring units 4 and 5 by the end of 2023 to the Company's current plan to retire them in 2031. I used forecasts APS provided in March 2020 and the Company's recently released 2020 IRP. Under a wide range of assumptions, I find that early retirement of the units would provide substantial savings to ratepayers. For instance, using the Company's 2020 IRP base case, I estimated savings between [redacted] This assessment relied on the Company's projections of the units' fixed and variable costs, as well as costs associated with ending their operations—such as any costs related to termination of the coal contract with the Navajo mine.

Given these results, APS should plan for the early retirement of these units and the Commission should consider my findings before allowing further expenditures at these units into rates, absent specific justifications for individual expenditures. If APS does not agree to retire the units in 2023, the Commission should require that the Company amend its 2020 IRP to include an evaluation of 2023 retirement (or a retirement as soon thereafter as possible). As noted, I may provide additional testimony on this topic following APS's response to Chairman Burns' September 1, 2020 letter.

Q. How did you choose the end of 2023 as an appropriate retirement date?

A. Retiring the units in 2023 is appropriate for a number of reasons. Although immediate retirement would likely result in more cost savings for ratepayers, I recognize that the Company cannot retire the units immediately. APS has various obligations, including to serve customers in the units' absence by procuring replacement energy and capacity, as needed, and to honor contracts with other parties. For instance, the owners of the units signed a coal contract with NTEC which provides fuel for the units through 2031.[68] However, APS stated that it could terminate its participation in that contract with 24 months' notice.[69] A retirement date for the end of 2023 would give APS more than 3 years (39 months) as of this filing to coordinate the units' retirement, exit the coal contract, and procure replacement resources.

Q. Please describe the costs related to retiring unit 4 and 5 that you considered for both 2023 and 2031 retirement scenarios.

A. Costs for ceasing the units' operations fall into three broad categories: costs that are "avoidable," "unavoidable," or "incremental" with early retirement.[70]

Avoidable costs are those that would be saved if the units retired early. I include the following avoidable costs that must be incurred if the units operate until 2031, but not if they retire in 2023:

[68] Ariz. Pub. Serv. Application at 163, Schedule E-9, Docket No. E-01345A-19-0236 (Nov. 11, 2019), *available at* https://docket.images.azcc.gov/E000003517.pdf.
[69] Attach. TC-2, APS Response to SC DR 2.3(f)(iii) (the un-redacted version of APS Response to SC DR 2.3 is included in Attach. TC-4).
[70] These three categories are also used by Consumers Energy in Michigan.

- Fuel, variable O&M, fixed O&M, and capital spending at the units from 2024 through 2031.[71]
- Performance bond costs at the Navajo Mine from 2024 through 2031.[72]
- Other coal contract costs required from 2024 through 2031.[73]

Unavoidable costs are those could be incurred regardless of the units' retirement date. Because these could be incurred in both retirement years, there was no need to include them in my analysis. Therefore, for both the 2023 and 2031 retirement years, I did not include:

- Capital costs invested in the units through 2023, such as the SCRs.[74]
- Fuel, variable O&M, fixed O&M, and capital spending at the units through 2023.
- Final cleanup costs related to the Four Corners units or any other legally-required environmental closure costs.

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[71] Note that Attachment TC-4, Highly Confidential Attachment "SC 1.16_ExcelAPS19RC00885_ Unit ALL_Highly CONF" (referred to in APS Supplemental Response to SC DR 1.16) provides future fuel, variable O&M, and generation costs. Attachment TC-4, Highly Confidential Attachment "SC 1.16_ExcelAPS19RC00884A_ Plant FIXED_Highly CONF" (referred to in APS Second Supplemental Response to SC DR 1.16) and Attachment TC-4, Highly Confidential Attachment "SC 2.5_ExcelAPS19RC01226_Fixed Fuel and O&M Costs_HIGHLY CONF" (referred to in APS Response to SC DR 2.5(a)) provide forecasts of fixed costs. [redacted] For my analysis, I assumed the [redacted]

[72] The Company's response to Sierra Club Discovery Request 3.1(a) states that performance bond costs are avoidable if APS terminates the coal contract with two years notice (the un-redacted version of APS Response to SC DR 3.1is included in Attachment TC-3).

[73] Attach. TC-2, APS Response to SC DR 3.1(a)(i) (the un-redacted version of APS Response to SC DR 3.1is included in Attachment TC-3).

[74] Note that even if there were a disallowance for past investments, such as the SCRs, then any remaining, allowed cost would still be unavoidable and identical in both retirement years.

- Final reclamation costs at the Navajo Mine.[75]
- The lease with the Navajo Nation.[76]

Incremental costs are those costs directly associated with terminating the coal contract before it ends in 2031. Specifically, if the co-owners terminated the contract before it expired, they would be required to pay for termination costs associated with the mine. These costs are higher if the units retire early and the contract is terminated prior to 2031. The Company provided stranded costs for termination dates of July 1 of each year from 2020 through 2031. I included the following for each retirement date:

- For end of 2023 retirement, I assumed the July 1, 2023 termination cost of $39.1 million provided by APS.[77]
- For 2031 retirement, I assumed no termination cost.[78]

Q. Please describe the costs of replacement resources you used in your analysis.

A. I did not specify the type of replacement resources but instead modeled a generic replacement resource using a wide range of costs from $30 per MWh to $50 per MWh (levelized $2024). I then assumed that APS's projections of the units' generation from 2024 through 2031 would be completely replaced—assuming a 2 percent annual escalation rate for the replacement cost. The initial range of costs

[75] Blankenship Direct at 30:8-18.
[76] Attach. TC-2, APS Response to SC DR 1.4(j) states that APS has no way to terminate the lease early and that lease payments are locked in through 2031.
[77] Attach. TC-2, APS Response to SC DR 3.1(d) (the un-redacted version of APS Response to SC DR 3.1 is included in Attachment TC-3).
[78] *Id.* The Company indicated in response to Sierra Club Data Request 3.1(d) that there was a termination cost with July 2031 retirement of $12.8 million. However, to be conservative in favor of a 2031 retirement, I assumed that there would be no termination cost if the units operated through 2031.

skew high compared to all-source RFP bids received by nearby utilities for coal replacement (as discussed previously) in recent years. Nevertheless, I also calculated a "breakeven" replacement cost at which 2023 and 2031 retirement would be equal. If APS were to procure replacement resources (including a portfolio of replacement resources) at any cost below this "breakeven" level, a 2023 retirement and replacement would provide savings compared to operation through 2031.

Q. What are your findings regarding early retirement and replacement of Four Corners Units 4 and 5 based on the forecasts APS provided in March 2020?

A. My findings demonstrate APS's customers would save money if Four Corners retired in 2023 rather than 2031. I estimate that the savings are substantial, using low, mid, and high replacement costs of $30, $40, and $50 per MWh (respectively). Here, I relied on forecasts that APS provided to Sierra Club in March 2020 and produced "between the third quarter of 2016 and the third quarter of 2019."[79] The results, shown in Figure 5, include:

- At low replacement costs of $30 per MWh, the savings from 2023 retirement are nearly [redacted] NPV (2024 through 2031)
- At mid replacement costs of $40 per MWh, the savings from 2023 are [redacted] NPV (2024 through 2031)
- At high replacement costs of $50 per MWh, the savings from 2023 are over [redacted] NPV (2024 through 2031)

[79] Attach. TC-2, APS Response to SC DR 6.1(a).

Figure 5: Cumulative Savings from 2023 Retirement of Four Corners 4 and 5 ($2023 NPV mil) HIGHLY CONFIDENTIAL[80]

Q. Would customer savings occur immediately after 2023 retirement?

A. Yes, if the Company procured PPA replacements in this $30-$50 per MWh range, then the savings would be immediate. In 2024, the annual savings would range from [redacted]—shown in Figure 6—and the annual savings would escalate through 2030. Savings in 2031 are lower because APS assumes that the [redacted][81]

[80] *See supra* note 71; Attach. TC-3, Confidential Attachment "SC 2.3_APS19RC01236_FC Coal Cost Information and Forecasts_CONF" (referred to in APS Response to SC DR 2.3(d)(ii)) (the un-redacted version of APS Response to SC DR 2.3 is included in Attach. TC-4); Attach. TC-2, Attachment "SC 2.3_ExcelAPS19RC01224_Sellers Stranded Costs" (referred to in APS Supplemental Response to SC DR 2.3(f)(ii)) (the un-redacted version of APS Response to SC DR 2.3 is included in Attach. TC-4); Attach. TC-2, APS Response to SC DR 6.4(b).

[81] Attach. TC-4, Highly Confidential Attachment "SC 1.16_ExcelAPS19RC00885_ Unit ALL_Highly CONF" (referred to in APS Supplemental Response to SC DR 1.16).

Figure 6: Annual Savings from 2023 Retirement of Four Corners 4 and 5 ($mil)
HIGHLY CONFIDENTIAL[82]

Q. What is the "breakeven" replacement cost at which the costs of 2023 and 2031 retirement would be the same?

A. A replacement cost of [redacted] per MWh in 2024 (escalating at 2 percent annually) would be a "break even" point. Replacement costs below this level would produce savings from earlier retirement.

Q. Is it possible your analysis above actually underestimated savings?

A. Yes. Several of my assumptions were deliberately conservative (i.e., favorable to a 2031 retirement), including:

[82] *See supra* note 80.

- The forecasts of variable costs from APS did not include [redacted] The addition of [redacted] would increase the units' costs and thus increase savings from their retirement.
- I assumed the units would operate through December of 2023, but if it were feasible to retire the units earlier then there would be additional savings in 2023 that are not currently captured.
- I assumed APS would incur the same capital costs through 2023 whether the units retire at the end of that year or in 2031. But if APS planned for 2023 retirement, it is likely capital spending leading up to that date could be avoided. Savings from these avoided costs were not included in my analysis.
- I assumed that the units would operate at the level projected by APS. In the event that the units generated less energy—which could result from a variety of factors like lower-than-forecasted customer load, higher forced outages, carbon costs, or lower-than-anticipated gas prices—then the savings would be higher because there would be less replacement energy needed.

Q. Did you also conduct a forward-looking assessment using the Company's 2020 IRP modeling?

A. Yes. The analysis above was based on the information the Company provided for the most recent forecasts of Four Corners costs at the time of the data request.[83] The

[83] *See supra* note 70.

Company provided the data in early March 2020. Subsequently, the Company filed its 2020 IRP on June 26, 2020. As a check against the savings estimates above, I also evaluated retirement of the two units using the Company's 2020 IRP forecasts.

Q. Did the analysis of the Company's 2020 IRP modeling change your conclusions about Four Corners Units 4 and 5?

A. No. The IRP analysis reinforced my conclusion that the units should be retired. In the 2020 IRP, the Company modeled three carbon cost sensitivities starting in 2025: high, base, and no carbon cost.[84] It also modeled three portfolios that represented the approach to moving towards clean energy: Bridge, Shift, and Accelerate. In all three portfolios, Four Corners operates through 2031.[85] I used the Company's forecasts for the Bridge portfolio under its three carbon cost sensitivities.[86] The treatment of avoidable, unavoidable, and incremental costs remains consistent with what I described above.

The resulting savings from 2023 retirement of Four Corners 4 and 5 are shown below in Table 1. In the Bridge portfolio under the Company's 2020 IRP base case scenario, the savings from retiring the units by end-of-year 2023 was between [redacted] more than [redacted] than the savings I had estimated using the March 2020 forecasts provided in this proceeding. In addition to this "base case," which incorporated a base carbon cost, APS's 2020 IRP also

[84] 2020 IRP at 147.
[85] *Id*. at 18.
[86] The Company did not choose a preferred portfolio. I chose the Bridge portfolio to be conservative (favorable to Four Corners operating through 2031), as it had the lowest amount of carbon reduction of the three portfolios. [redacted]

evaluated "high carbon" and "no carbon" cases. Not surprisingly, a higher carbon cost would lead to higher retirement savings and, conversely, a lower carbon cost would lead to lower savings. The "breakeven" replacement cost using the 2020 IRP is between [redacted] and [redacted] per MWh. The average savings across the nine 2020 IRP combinations of replacement costs and carbon costs is [redacted].

Table 1: Cumulative Savings from 2023 Retirement of Four Corners 4 and 5 ($2023 NPV mil) HIGHLY CONFIDENTIAL[87]

	2020 IRP Bridge (high carbon)	2020 IRP Bridge (base carbon)	2020 IRP Bridge (no carbon)	APS March 2020 (no carbon)
Savings with $30/MWh replacement ($mil)	[redacted]	[redacted]	[redacted]	[redacted]
Savings with $40/MWh replacement ($mil)	[redacted]	[redacted]	[redacted]	[redacted]
Savings with $50/MWh replacement ($mil)	[redacted]	[redacted]	[redacted]	[redacted]
Breakeven replacement cost ($/MWh)	[redacted]	[redacted]	[redacted]	[redacted]

Q. Is it likely that the 2020 IRP savings estimates are too low?

A. Yes. The forecasts of fixed O&M for the two units are [redacted] in the 2020 IRP, compared to past IRPs and the forecasts provided in this case in March 2020.

[87] I relied on the following spreadsheets in my analysis: Highly Confidential Attachment "2.12_ExcelAPS19RC01442_Bridge-Base Output files_HIGHLY CONF" (referred to in APS Response to Citizen Groups DR 2.12); Highly Confidential Attachment "2.12_ExcelAPS19RC01743_APS 2020 IRP Carbon Sensitivity Bridge-High Carbon_HIGHLY CONF" (referred to in APS Response to Citizen Groups DR 2.12); Highly Confidential Attachment "2.12_ExcelAPS19RC01744_APS 2020 IRP Carbon Sensitivity Bridge-Low Carbon_HIGHLY CONF" (referred to in APS Response to Citizen Groups DR 2.12) (Sierra Club will not be providing the 2.12 attachments due to the confidential nature and volume of the documents. The spreadsheets are available on the case Sharepoint site pursuant with the protective agreement.); Attach. TC-4, Highly Confidential Attachment "Citizen Groups 2.14_ExcelAPS19RC01446_FC CAPEX_HIGHLY CONF" (referred to in APS Response to Citizen Groups DR 2.14);

Figure 7 shows the Company's various forecasts of fixed O&M. This shows that the March 2020 forecast is [redacted] with forecasts in the previous three IRPs (2012, 2014 and 2017) yet the 2020 IRP forecast is [redacted]

Figure 7: Four Corners Units 4 and 5 Fixed O&M ($mil) HIGHLY CONFIDENTIAL[88]

CAPEX_HIGHLY CONF" (referred to in APS Response to Citizen Groups DR 2.14); Attach. TC-3, Confidential Attachment "SC 6.4_ExcelAPS19RC01807_Bridge_Base_CONF" (referred to in APS Response to Sierra Club DR 6.4); Attach. TC-2, APS response to SC DR 6.4(b); Attach. TC-3, Confidential Attachment "SC 2.3_APS19RC01236_FC Coal Cost Information and Forecasts_CONF" (referred to in APS Response to SC DR 2.3(d)(ii)) (the un-redacted version of APS Response to SC DR 2.3 is included in Attach. TC-4); Attach. TC-2, Attachment "SC 2.3_ExcelAPS19RC01224_Sellers Stranded Costs" (referred to in APS Response to SC DR 2.3(f)(ii)) (the un-redacted version of APS Response to SC DR 2.3 is included in Attach. TC-4).

[88] Attach. TC-3, Confidential Attachment "SC 2.1_ExcelAPS19RC01244_12IRP FC Rev Req_CONF" (referred to in APS Supplemental Response to SC DR 2.1(b)); Attach. TC-3, Confidential Attachment "2.1_ExcelAPS19RC01247_14IRP FC Rev Req_CONF" (referred to in APS Supplemental Response to SC DR 2.1(b)); Attach. TC-3, Confidential Attachment "SC 2.1_ExcelAPS19RC01250_17IRP FC Rev Req_CONF (referred to in APS Supplemental Response to SC DR 2.1(b)); Attach. TC-3, Confidential Attachment "SC 6.4_ExcelAPS19RC01807 _Bridge _Base_CONF" (provided as an attachment to APS Response to SC DR 6.4); Attach. TC-4, Highly Confidential Attachment "SC

Q. Did you conduct a sensitivity analysis of the 2020 IRP savings estimates using fixed O&M from March 2020?

A. Yes. Substituting the March 2020 fixed O&M, which is [redacted] with past IRP forecasts, the retirement savings estimates using the 2020 IRP forecasts would increase by [redacted] across the board. The IRP results, updated with the March 2020 fixed O&M estimate, are shown below in Table 2. After this substitution, my original savings estimates (using all March 2020 forecasts) and the 2020 IRP, no carbon sensitivity are similar. These savings estimates range from [redacted] And as noted above, the savings increase with increasing carbon cost assumptions in the base case and high carbon cases. Using the Company's 2020 IRP base case and comparing across the results in Tables 1 and 2, I estimate savings between [redacted] (with the $50/MWh replacement and 2020 IRP fixed O&M) and [redacted] (with the $30/MWh replacement and March 2020 fixed O&M).

2.5_ExcelAPS19RC01226_Fixed Fuel and O&M Costs_HIGHLY CONF" (referred to in APS Response to SC DR 2.5(a)).

Table 2: Cumulative Savings from 2023 Retirement of Four Corners 4 and 5, using APS March 2020 Fixed O&M Forecast ($2023 NPV mil) HIGHLY CONFIDENTIAL[89]

	2020 IRP Bridge (high carbon)	2020 IRP Bridge (base carbon)	2020 IRP Bridge (no carbon)	APS March 2020 (no carbon)
Savings with $30/MWh replacement ($mil)	[redacted]	[redacted]	[redacted]	[redacted]
Savings with $40/MWh replacement ($mil)	[redacted]	[redacted]	[redacted]	[redacted]
Savings with $50/MWh replacement ($mil)	[redacted]	[redacted]	[redacted]	[redacted]
Breakeven replacement cost ($/MWh)	[redacted]	[redacted]	[redacted]	[redacted]

Q. Is the fact that a 2023 retirement results in customer savings sensitive to key inputs?

A. No. While the magnitude of the savings changes depending on the factors outlined above, all of my calculations show substantial savings from 2023 retirement regardless of the chosen assumptions for replacement costs, carbon costs, and fixed O&M costs.

IV. CONCLUSIONS AND RECOMMENDATIONS

Q. What do you conclude from your analysis of Four Corners Units 4 and 5?

A. The Company has continually failed to adequately assess these units' future no matter the underlying market conditions that they face. Since acquiring a larger share of the units in 2013, gas price forecasts have decreased and remain low; and

[89] *See supra* note 87; Attach. TC-4, Highly Confidential Attachment "SC 2.5_ExcelAPS19RC01226_Fixed Fuel and O&M Costs_HIGHLY CONF" (referred to in APS Response to SC DR 2.5(a)).

renewable and storage resources have become low-cost options compared with continued coal operation. The Company also spent hundreds of millions on SCR retrofits, without considering foregoing such spending and retiring the units prior to 2031.

While I am not recommending disallowances for expenditures before the current test year, APS's conduct at prior decision points establishes a clear pattern of failing to prudently evaluate ongoing operations at Four Corners Units 4 and 5 on the part of APS. Most importantly, the Company has yet to look at retiring the units prior to 2031 in the face of mounting evidence that these units are losing APS's customers money.

In place of an analysis by APS, I conducted my own forward-looking economic assessment of the units, relying on APS's own projections of the coal units' costs, and I have found that there would be substantial savings from retiring units 4 and 5 in 2023 instead of 2031, ranging from [redacted] These findings show that the units should be retired as soon as possible. If APS does not decide to retire the units, the Commission should require that the Company evaluate earlier retirement in the 2020 IRP and subsequent IRPs. Accordingly, it is clear that continued investment in and operation of Four Corners Units 4 and 5 beyond 2023 is an imprudent use of resources that should not be carried by ratepayers.

Q. How do you recommend that APS and the Commission address test year and future capital spending at Four Corners Units 4 and 5?

A. There may be planned capital spending included in the revenue requirement for this rate case that would have been unnecessary if APS had prudently evaluated retiring the units before 2031.[90] APS had ample evidence showing that the economics of the units were eroding, well before this rate case. Given the evidence that early retirement of these units would provide substantial savings, a prudent utility would have re-evaluated the long-term operations of the units and modified its planned capital projects accordingly.

It would be unfair and unreasonable to require customers to pay for those capital costs that should have been avoided. However, I am not currently in a position to identify particular projects that could have been avoided during the test year or could be avoided moving forward; rather, APS, as the plant operator, is in the best position to do so. Yet, as of this filing, the Company has refused to provide such an evaluation when asked.[91] Notably, APS's 2020 IRP projects a [redacted] when the plant is assumed to retire in 2031; it is therefore likely that a [redacted] if there were a 2023 retirement.[92] Therefore, the Commission should direct APS to identify such avoidable spending during the test year and

[90] As noted, for Four Corners 4 and 5 specifically, Exhibit BDL-4DR includes $10.1 million in "total projected costs"; Exhibit BDL-5DR includes $58.9 million in "total projected costs."
[91] Attach. TC-2, APS Response to SC DR 7.1.
[92] Attach. TC-4, Highly Confidential Attachment "Citizen Groups 2.14_ExcelAPS19RC01446_FC CAPEX_HIGHLY CONF" (referred to in APS Response to Citizen Groups DR 2.14).

moving forward, and hold this rate proceeding open until such as time as the Commission and other parties are able to review such an evaluation. All avoidable costs should be disallowed from rates.

Q. How do you recommend that APS and the Commission address replacement for these units should they retire?

A. The Commission should direct APS to issue an all-source RFP with the intention of fulfilling its energy and capacity needs in the absence of its share in Four Corners Units 4 and 5, for an in-service date of no later than the end of 2023. In order to encourage a robust, competitive sample of bids, the RFP process should involve: 1) ample time for response from bidders—e.g. more than one month; 2) no preference for technology type, size of project, or ownership; and 3) an independent evaluator. Two examples of all-source RFP's that successfully garnered competitive and robust bids were discussed previously in this testimony: Xcel Colorado and PNM.

The Commission should open a docket to address this replacement process so that stakeholders can be involved in the development of the RFP, choice of independent evaluator, and selection of replacement resources.

Even if the Commission disagrees that Units 4 and 5 should be retired in 2023, then it should still direct the Company to issue an all-source RFP described above to evaluate the units' future. Bids from this RFP could then be modeled to compete with existing APS units, such as Four Corners Units 4 and 5.

Q. Does this conclude your testimony?

A. Yes.

Attachment TC-1

Resume of Tyler Comings

Applied Economics Clinic
Economic and Policy Analysis of Energy, Environment and Equity

Tyler Comings, Senior Researcher

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PROFESSIONAL EXPERIENCE

Applied Economics Clinic, Arlington, MA. Senior Researcher, June 2017 – Present.

Provides technical expertise on electric utility regulation, energy markets, and energy policy. Clients are primarily public service organizations working on topics related to the environment, consumer rights, the energy sector, and community equity.

Synapse Energy Economics Inc., Cambridge, MA. Senior Associate, July 2014 – June 2017, Associate, July 2011 – July 2014.

Provided expert testimony and reports on energy system planning, coal plant economics and economic impacts. Performed benefit-cost analyses and research on energy and environmental issues.

Ideas42, Boston, MA. Senior Associate, 2010 – 2011.

Organized studies analyzing behavior of consumers regarding finances, working with top researchers in behavioral economics. Managed studies of mortgage default mitigation and case studies of financial innovations in developing countries.

Economic Development Research Group Inc., Boston, MA. Research Analyst, Economic Consultant, 2005 – 2010.

Performed economic impact modeling and benefit-cost analyses using IMPLAN and REMI for transportation and renewable energy projects, including support for Federal stimulus applications. Developed a unique web-tool for the National Academy of Sciences on linkages between economic development and transportation.

Harmon Law Offices, LLC., Newton, MA. Billing Coordinator, Accounting Liaison, 2002 – 2005.

Allocated IOLTA and Escrow funds, performed bank reconciliation and accounts receivable. Projected legal fees and costs.

Massachusetts Department of Public Health, Boston, MA. Data Analyst (contract), 2002.

Designed statistical programs using SAS based on data from health-related surveys. Extrapolated trends in health awareness and developed benchmarks for performance of clinics for a statewide assessment.

EDUCATION

Tufts University, Medford, MA

Master of Arts in Economics, 2007

Boston University, Boston, MA

Bachelor of Arts in Mathematics and Economics, Cum Laude, Dean's Scholar, 2002.

AFFILIATIONS

Society of Utility and Regulatory Financial Analysts (SURFA)

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Global Development and Environment Institute, Tufts University, Medford, MA.
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CERTIFICATIONS

Certified Rate of Return Analyst (CRRA), professional designation by Society of Utility and Regulatory Financial Analysts (SURFA)

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Comings, T. 2013. *Testimony regarding East Kentucky Power Cooperative's Application for Cooper Station Retrofit and Environmental Surcharge Cost Recovery*. Testimony to the Kentucky Public Service Commission, Case No. 2013-00259. November 27, 2013 and December 27, 2013. [Online]

Comings, T. 2013. *Testimony in the Matter of Indianapolis Power & Light Company's Application for a Certificate of Public Convenience and Necessity for the Construction of a Combined Cycle Gas Turbine Generation Facility*. Testimony to the Indiana Utility Regulatory Commission, Cause No. 44339. [Online]

Hornby, R. and T. Comings. 2012. *Comments on Draft 2012 Integrated Resource Plan for Connecticut.* Synapse Energy Economics. Prepared for AARP. [Online]

Resume dated August 2020

Attachment TC-2

Public Discovery Responses

Confidential and Highly Confidential
Information has been redacted.

Public APS Responses to Data Requests:

1. APS Response to SC DR 1.4
2. APS Supplemental Response to SC DR 1.12
3. APS Supplemental Response to 1.16
4. APS Second Supplemental Response to SC DR 1.16
5. APS Response to SC DR 1.17
6. APS Supplemental Response to SC DR 1.21
7. APS Supplemental response to SC DR 1.22
8. APS Response to SC DR 1.23
9. APS Supplemental Response to SC DR 1.26
10. APS Response to SC DR 1.27
11. APS Supplemental Response to SC DR 2.1
12. APS Response to SC DR 2.3 (Redacted)
13. Attachment "SC 2.3_ExcelAPS19RC01224_Sellers Stranded Costs" (referred to in APS Response to SC DR 2.3(f)(ii))
14. APS Response to SC DR 3.1 (Redacted)
15. APS Response to SC DR 6.1
16. APS Response to SC DR 6.4
17. APS Response to SC DR 7.1
18. APS Response to Citizen Groups DR 2.12
19. APS Response to Citizen Groups DR 2.14

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FEBRUARY 20, 2020

SC 1.4: For each of the Four Corners units 1 through 5, please provide the following information:

a. Identify the currently applicable coal fuel supply contract(s), including the supplier for such contracts. Please provide copies of each contract.

b. Identify the term of any currently applicable coal fuel supply contract (i.e. length of the contract until expiration or option to renew).

c. Indicate whether the coal fuel supply contract includes any minimum take provisions.

d. Indicate liquidated damages for each year, and how these are calculated.

e. For each minimum take provision identified in (c), please provide:

i. The minimum annual tons required to be purchased,

ii. The cost to the Company for not meeting such minimum take requirements (either on a dollar/ton basis or as liquidated damages, or both), and

iii. The conditions, if any, under which the Company is relieved of its obligations to take the minimum amount of coal specified in the contract.

f. A copy of the lease.

g. Annual lease payments made by APS since the start of the lease.

h. Projections of lease payments through the end of the lease.

i. Analyses conducted by or for APS used to justify extension of the lease.

j. Indicate damages that would be paid for early exit from the lease and how such damages are calculated.

k. Does the Company have plans to modify the Four

SC 1.4 (continued): Corners units such that they will have lower minimum output levels?

i. If so, explain those plans, and identify the new minimum operating levels that each unit will have following such modifications.

l. For each Four Corners unit, identify the current maximum 1-hour ramp rate.

m. For each Four Corners unit, identify the current maximum 5-minute ramp rate.

n. Does the Company have plans to modify the Four Corners units such that they will have higher maximum ramp rates?

i. If so, explain those plans, and identify the new maximum ramp rates that each unit will have following such modifications.

o. Within the past 30 years, has APS encountered any extreme weather or natural gas infrastructure interruption events that have been mitigated by the existence of coal units with on-site fuel inventory?

i. If so, identify all such events and explain the role played by coal units with on-site fuel inventory.

Response: Subject to and without waiving the objection(s) below, APS will provide responsive information.

Please note that some of this information may only be provided upon execution of a Protective Agreement because the information is either Confidential or Highly Confidential. APS will provide this responsive information upon execution of a Protective Agreement.

With regard to subpart (i), APS objects to this request to the extent that it seeks information regarding the prudency of the Four Corners Power Plant. The discovery sought is neither relevant nor reasonably calculated to lead to admissible evidence for any party's claim or defense. The prudency of the continued operation of the Plant was litigated and conclusively decided in prior Commission decisions in which the Sierra Club participated. This matter is not

Response to SC 1.4 (continued): the appropriate mechanism for seeking to reopen and modify final Commission decisions under Arizona law.

Supplemental Response:

a. The current Coal Supply Agreement (CSA) is attached as APS19RC00886, effective as of July 1, 2018. This agreement is between the Navajo Transitional Energy Company, LLC and the non-NTEC participant buyers of the Four Corners Generating Station coal (APS, TEP, SRP and PNM). The agreement is Highly Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

b. The term on the CSA is from July 1, 2018 – July 6, 2031.

c. Please refer to Section 4.5 of the CSA provided in part a.

d. Please refer to Section 5 of the CSA provided in part a.

e. Please refer to Sections 5 and 20 of the CSA provided in part a.

f. Please see attachments APS19RC00871 through APS19RC00875 for the entire lease agreement.

g. Please see summary in attachment ExcelAPS19RC00870.

h. Please see summary in attachment ExcelAPS19RC00870.

i. Please see APS's objection above.

j. There are no damages, however, there are no "out" provisions either. APS is required to pay the rent payments through the end of the lease.

k. APS has recently explored lowering the minimum output levels of the plant, and has found technical and operational challenges that prevent it from being decreased from its current limit.

l. Current plant committed ramp rate is 5.0 Megawatts per minute (MW/min). Based on the last Southwest Reserve Sharing Group (SRSG) test the Unit 4 achieved a ramp rate of 5.3 MW/min. while Unit 5 achieved 5.1 MW/min. However, over the longer period of time the average ramp rate are 4.5 MW/min for Unit 4 and 4.1 MW/min for Unit 5.

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SC 1.12: Please confirm that APS did not evaluate any alternatives that included the retirement of any Four Corners plant units prior to 2031 as part of its 2017 IRP.

a. If not confirmed, explain why not.

b. Is APS committing to conduct any economic evaluation of alternative Four Corners retirement dates as part of its 2020 IRP?

i. If so, explain APS's planned process for evaluating economic retirement dates for the Four Corners units.

ii. If not, explain why not.

Response: APS will provide a response to this request subject to and without waiving the objection(s) below.

APS objects to this request to the extent that it seeks information regarding the prudency of the Four Corners Power Plant and the need to install the Selective Catalytic Reduction (SCR) equipment. The discovery sought is neither relevant nor reasonably calculated to lead to admissible evidence for any party's claim or defense, and is not proportional to the needs of the case. The prudency of the continued operation of the Plant was litigated and conclusively decided in prior Commission decisions in which the Sierra Club participated. This matter is not the appropriate mechanism for seeking to reopen and modify final Commission decisions under Arizona law.

Supplemental Response:

a. Confirmed. APS did not evaluate alternatives that retired Four Corners prior to 2031 in its 2017 IRP for several reasons. Four Corners is jointly owned by APS and four other entities and together, owners have a coal contract that runs through 2031. It is not an option for APS to retire the plant without agreement of the other owners. Furthermore, community impacts of retiring the plant are significant and must be carefully considered even before such evaluations could be made. Please note that Four Corners Units 1, 2, and 3 were retired in 2012.

b. No.

i. N/A.

ii. Please see response to SC 1.12a

Witness: Brad Albert

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SC 1.16: For each of the Company's coal and natural gas units, please provide, based on the most recent forecast, for each of the years 2019 through 2035, please specify the percentage of ownership being reported and identify the projected:

a. Installed capacity.

b. Capacity factor.

c. Summer capacity rating.

d. Forced outage rate.

e. Planned outage rate.

f. Equivalent Availability Factor (EAF).

g. Heat rate.

h. Generation.

i. Fixed O&M costs.

j. Non-fuel variable O&M costs.

k. Fuel costs.

l. Fuel usage (MMBtu) by type.

m. Environmental capital costs.

n. Non-environmental capital costs.

o. Energy revenues (i.e., avoided energy purchase costs).

p. Ancillary services revenues.

q. Any other revenues.

r. Depreciation cost.

s. Undepreciated net book value.

t. Property taxes.

u. Property insurance.

Witness: Brad Albert

Response: Subject to and without waiving the objection(s) below, APS will provide responsive information for its most recent forecast and subject to its receipt of an executed Protective Agreement. Please note that some of this information may only be provided upon execution of a Protective Agreement because the information is either Confidential or Highly Confidential.

APS objects that this request is overly broad, cumulative, and unduly burdensome, to the extent it seeks all forecasts related to all subparts of the request for a period of more than 15 years.

Supplemental Response: Please see ExcelAPS1900884 and ExcelAPS19RC00885 for the requested information. This information is Highly Confidential and is being provided pursuant to an executed Protective Agreement in this docket. Also the information provided below reflects APS ownership share. Some of the information is available and provided on a unit level, while some is only available and provided at a plant level.

a. Please see ExcelAPS19RC00885, "APS Unit Capacity" tab, column B.

b. Please see ExcelAPS19RC00885, "APS Unit" tab.

c. Please see ExcelAPS19RC00885, "APS Unit Capacity" tab, column C.

d. Please see ExcelAPS19RC00885, "APS Unit EFOR" tab, column B for EFOR, and column C for FOR.

e. Please see ExcelAPS19RC00885, "APS Unit Planned Maintenance" tab.

f. Equivalent Availability Factor can be calculated from information provided in sub-parts d and e.

g. Please see APS's response to part b above.

h. Please see APS's response to part b above.

i. Please see ExcelAPS19RC00884 for the information report at plant level.

Witness: Brad Albert

j. Please see APS's response to part b above.

k. Please see APS's response to part b above.

l. Please see APS's response to part b above.

m. APS is still working to compile this information and will supplement this response as soon as the information is available.

n. Please see APS's response to part m above.

o. APS does not forecast this information.

p. APS does not forecast this information.

q. APS does not forecast this information.

r. Please see APS's response to part i above.

s. Please see APS's response to part i above (column entitled "BOY OCLD").

t. Please see APS's response to part i above.

u. Property insurance is carried at the PNW level, and is not forecasted at sub-levels such as power plants.

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SC 1.16: For each of the Company's coal and natural gas units, please provide, based on the most recent forecast, for each of the years 2019 through 2035, please specify the percentage of ownership being reported and identify the projected:

a. Installed capacity.

b. Capacity factor.

c. Summer capacity rating.

d. Forced outage rate.

e. Planned outage rate.

f. Equivalent Availability Factor (EAF).

g. Heat rate.

h. Generation.

i. Fixed O&M costs.

j. Non-fuel variable O&M costs.

k. Fuel costs.

l. Fuel usage (MMBtu) by type.

m. Environmental capital costs.

n. Non-environmental capital costs.

o. Energy revenues (i.e., avoided energy purchase costs).

p. Ancillary services revenues.

q. Any other revenues.

r. Depreciation cost.

s. Undepreciated net book value.

t. Property taxes.

u. Property insurance.

Witness: Brad Albert

Response: Subject to and without waiving the objection(s) below, APS will provide responsive information for its most recent forecast and subject to its receipt of an executed Protective Agreement. Please note that some of this information may only be provided upon execution of a Protective Agreement because the information is either Confidential or Highly Confidential.

APS objects that this request is overly broad, cumulative, and unduly burdensome, to the extent it seeks all forecasts related to all subparts of the request for a period of more than 15 years.

Supplemental Response: Please see ExcelAPS1900884 and ExcelAPS19RC00885 for the requested information. This information is Highly Confidential and is being provided pursuant to an executed Protective Agreement in this docket. Also the information provided below reflects APS ownership share. Some of the information is available and provided on a unit level, while some is only available and provided at a plant level.

a. Please see ExcelAPS19RC00885, "APS Unit Capacity" tab, column B.

b. Please see ExcelAPS19RC00885, "APS Unit" tab.

c. Please see ExcelAPS19RC00885, "APS Unit Capacity" tab, column C.

d. Please see ExcelAPS19RC00885, "APS Unit EFOR" tab, column B for EFOR, and column C for FOR.

e. Please see ExcelAPS19RC00885, "APS Unit Planned Maintenance" tab.

f. Equivalent Availability Factor can be calculated from information provided in sub-parts d and e.

g. Please see APS's response to part b above.

h. Please see APS's response to part b above.

i. Please see ExcelAPS19RC00884 for the information report at plant level.

j. Please see APS's response to part b above.

k. Please see APS's response to part b above.

l. Please see APS's response to part b above.

m. APS is still working to compile this information and will supplement this response as soon as the information is available.

n. Please see APS's response to part m above.

o. APS does not forecast this information.

p. APS does not forecast this information.

q. APS does not forecast this information.

r. Please see APS's response to part i above.

s. Please see APS's response to part i above (column entitled "BOY OCLD").

t. Please see APS's response to part i above.

u. Property insurance is carried at the PNW level, and is not forecasted at sub-levels such as power plants.

Second Supplemental Response: For parts m and n, please see the updated attachment ExcelAPS19RC00884A, which contains in Column G of each tab a capital forecast from approximately June 2018, including both environmental and non-environmental capital. This information is Highly Confidential and being provided pursuant to an executed Protective Agreement.

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SC 1.17:

For each of the Company's coal units, please identify the amount of money that APS has included in the Company's Test Year spending as proposed in this case, by the following types:

a. Capital.

b. Fuel.

c. Non-fuel Operations & Maintenance.

d. Other.

Response: The summary below reflects the total company amounts included in the adjusted Test Year by Plant and by type. Please also refer to APS's response to Sierra Club 1.18, which states APS is not proposing a change to the base fuel rate.

Four Corners

a. $833,795,812 – Net Book Value @ 6/30/2019
b. $187,509,568 – fuel expense
c. $101,885,495 – non-fuel O&M expense
d. $1,078,301 – other income

Cholla

a. $301,032,062 – Net Book Value @ 6/30/2019
b. $44,474,569 – fuel expense
c. $37,473,111 – non-fuel O&M expense
d. $60,267 – other income

Navajo

a. $0 - Net Book Value @ 6/30/2019, item is a Regulatory Asset with book value of $73,226,933 @ 6/30/2019
b. $36,636,648 – fuel expense
c. None
d. None

Witness: Elizabeth Blankenship

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SC 1.21: Please provide each forecast produced by or for the Company for the years 2015 through present (latest available) and specify the percentage of ownership being reported (where applicable):

a. Wholesale energy market prices.

b. Coal prices.

c. Natural gas prices.

d. Generation of each Four Corners unit.

e. Forced outage rate at each Four Corners unit.

f. Planned outage rate at each Four Corners unit.

g. Fixed O&M costs at each Four Corners unit.

h. Non-fuel variable O&M costs at each Four Corners unit.

i. Fuel costs at each Four Corners unit.

j. Fuel usage (MMBtu) by type at each Four Corners unit.

k. Environmental capital costs at each Four Corners unit.

l. Non-environmental capital costs at each Four Corners unit.

m. For (a)-(l), provide the date each forecast was produced.

Response: APS objects to this request to the extent that it seeks information regarding the prudency of the Four Corners Power Plant and the need to install the Selective Catalytic Reduction (SCR) equipment. The discovery sought is neither relevant nor reasonably calculated to lead to admissible evidence for any party's claim or defense, and is not proportional to the needs of the case. The prudency of the continued operation of the Plant was litigated and conclusively decided in prior Commission decisions in which the Sierra Club participated. This matter is not the appropriate mechanism for seeking to reopen and modify final Commission decisions under Arizona law.

In addition, this request is overly broad, unduly burdensome, and cumulative, to the extent it seeks all forecasts from 2015 to the

Response to SC 1.21 (continued): present, APS also objects information is either Confidential or Highly Confidential.

Supplemental Response: Subject to and without waiving its prior objections, and pursuant to an agreement with Sierra Club in an effort to resolve discovery disputes, APS is providing the requested information from three forecasts – the APS 2012, 2014 and 2017 IRPs, each of which have also been provided in APS's response to SC 1.23. Please see the attached document APS19RC01063 for reference to where the information is located in the IRPs themselves, and ExcelAPS19RC01064 for supplemental information of the same vintage that was not contained in the IRPs. Information provided in spreadsheet ExcelAPS19RC001064 is Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

a. Please see the attached spreadsheet ExcelAPS19RC01064.

b. Please see the cross-reference document APS19RC01063.

c. Please see the cross-reference document APS19RC01063.

d. Please see the cross-reference document APS19RC01063.

e. Please see the attached spreadsheet ExcelAPS19RC01064.

f. Please see the attached spreadsheet ExcelAPS19RC01064.

g. Please see the cross-reference document APS19RC01063.

h. Please see the cross-reference document APS19RC01063.

i. Please see the cross-reference document APS19RC01063.

j. Please see the cross-reference document APS19RC01063.

k. Please see the attached spreadsheet ExcelAPS19RC01064.

l. Please see the attached spreadsheet ExcelAPS19RC01064.

m. 2012 IRP information was prepared in September 2011; 2014 IRP information was prepared in September 2013; and 2017 IRP information was prepared in September 2016.

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SC 1.22: Please provide each forecast reviewed by the Company developed in 2015 through present (or the latest available) regarding:

a. Wholesale energy market prices.

b. Coal prices.

c. Natural gas prices.

d. For (a)-(c), provide dates that these forecasts were reviewed—preferably the day, if not the month.

Response: Subject to and without waiving the objection(s) below, APS will provide responsive information for its most recent forecast and subject to its receipt of an executed Protective Agreement.

APS objects that this request it is overly broad, cumulative, and unduly burdensome, and seeks APS information that is either Confidential or Highly Confidential, as well as Confidential or Highly Confidential information owned by third parties and which APS is prohibited from disclosing.

APS also objects that this request seeks information that is vague, irrelevant, overly broad and unduly burdensome, to the extent the requests seeks specific details regarding each forecast reviewed by date.

Supplemental Response: Please see ExcelAPS19RC00773 for fuel and wholesale power prices used in APS planning models, one for each year beginning in 2015. Many forecasts from third party sources are reviewed and used in the development of these prices as described below. APS has contracts with the third party sources that prohibit the Company from disclosing this information.

a. The Company does not just rely on one forecast for wholesale energy market prices. Wholesale energy market prices are analyzed on a daily basis, with information coming from four external brokers.

b. Coal pricing is based upon a variety of indexes spelled out in the APS's coal supply agreements. Historical and forward index trends are internally reviewed twice annually, generally in the March and September time frames.

c. Natural gas prices are received daily and are based upon ICE cleared prices for both basins from which APS procures gas.

d. Please see APS's responses to a through c above.

Witness: Brad Albert

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SC 1.23: Please provide the last three Integrated Resource Plans (IRPs) developed by the Company, in unredacted form.

Response: Please see the attachments below. Confidential and Highly Confidential versions of the Company's IRPs as shown below are being provided pursuant to an executed Protective Agreement in this docket.

Non-Confidential IRP Versions:

APS 2012 IRP	APS19RC00713
APS 2012 IRP Revisions	APS19RC00761
APS 2014 IRP	APS19RC00714
APS 2017 IRP	APS19RC00715

Confidential and Highly Confidential IRP Versions:

APS 2012 IRP Confidential Excerpts	APS19RC00762
APS 2012 IRP Confidential Revisions	APS19RC00716
APS 2014 IRP Confidential Excerpts	APS19RC00717
APS 2017 IRP Confidential Version	APS19RC00715

Witness: Brad Albert

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SC 1.26: Refer to the Direct Testimony of Barbara D. Lockwood, page 5, line 21 through page 6, line 5.

a. Identify and produce any analyses, studies, or other documents supporting the prudency of the Four Corners SCR Project.

b. Did the Company conduct an economic or net present value analysis of the SCR investment at Four Corners, relative to other supply- and demand-side alternatives, prior to deciding to installing the SCR?

i. If so:

1. Identify the date and describe the results of each such analysis.

2. Provide all economic analyses conducted prior to the SCR installation, including supporting workpapers and any modeling input and output files, in executable format (preferably Excel) with all calculations and formulas intact.

ii. If not, explain why not.

c. Has the Company conducted any forward-looking economic or net present value analysis of either or both of Four Corners Units 4 and 5 relative to other supply- and demand-side resource options since construction of the SCR began?

i. If so:

1. Identify the date and describe the results of each such analysis.

2. Provide all economic analyses conducted since the start of the SCR project, including supporting workpapers and any modeling input and output files in executable format (preferably Excel) with all calculations and formulas intact.

ii. If not, explain why not.

SC 1.26 (continued):

d. Has the Commission previously approved of APS's plan to construct the SCR project?

i. If so, identify the Commission order approving that plan.

Response: Subject to and without waiving the objection(s) below, APS will provide some responsive information for subparts (a) and (b). Please note that some of this information may only be provided upon execution of a Protective Agreement because the information is either Confidential or Highly Confidential. APS will provide this responsive information upon its receipt of an executed Protective Agreement.

APS objects to this request to the extent that it seeks information regarding the prudency of the Four Corners Power Plant and the need to install the Selective Catalytic Reduction (SCR) equipment. The discovery sought is neither relevant nor reasonably calculated to lead to admissible evidence for any party's claim or defense, and is not proportional to the needs of the case. The prudency of the continued operation of the Plant was litigated and conclusively decided in prior Commission decisions in which the Sierra Club participated. This matter is not the appropriate mechanism for seeking to reopen and modify final Commission decisions under Arizona law.

Supplemental Response:

a. The SCR projects were mandated by the EPA in 2012 as a condition to continue operations of the plant past July of 2018. In anticipation of that federal mandate, the SCRs were included in the analyses filed with the ACC in 2010 when APS sought approval to acquire SCE's share of Four Corners Units 4 and 5 (Docket No. E-01345A-10-0474). And after the EPA's mandate, APS included consideration of the SCRs in its 2013 filing when it sought a Commission determination that the Four Corners Acquisition was prudent (Docket No. E-01345A-11-0224). Importantly, the Commission found the acquisition to be prudent while acknowledging that the SCR installation was needed to keep Four Corners running after 2018. This finding necessarily means that prudency of APS's installation of SCRs has already been decided by the Commission. Please also see the Administrative Law Judge's Recommended Opinion and Order (issued November 27, 2018) in Docket No. E-01345A-16-0036 et. al., which recommends the testimony and evidence presented in that case supports a finding that

Supplemental Response to SC 1.26 (continued):

the SCR project was completed in a reasonable, cost-efficient, and prudent manner.

b. Yes. In 2008, and 2009, as part of the Best Available Retrofit Technology (BART) analysis required by the Environmental Protection Agency (EPA) under the Clean Air Act, APS evaluated more than a dozen alternatives for reducing emissions from the Four Corners Power Plant. Please see the attached document APS19RC00799 – Black and Veatch Final NOx Compliance Report for Four Corners Steam Electric Station Units 1 through 5, released in 2010. In addition, attached as APS19RC00800 is a presentation made in 2009 to the Commission regarding APS's SCR analysis.

c. Notwithstanding the above objection, APS responds that other than the overall analyses conducted in conjunction with the Commission's Integrated Resource Planning process, the Company has not conducted any forward-looking economic analysis of either or both of Four Corners Units 4 and 5 since the SCR project began in early 2014. The decision to continue operation of Four Corners was made in conjunction with the execution of agreements and commitments with other plant owners, the coal provider, and the Navajo Nation.

d. Yes. Please see the Company's response to part a.

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SC 1.27: Refer to the Direct Testimony of Barbara D. Lockwood, page 8, lines 5-8.

a. Explain the basis for your claim that the Four Corners SCR investment was "necessary to provide reliable, cleaner, and sustainable power to our customers."

b. Is the Company's determination that the Four Corners SCR investment was "necessary" based on an economic assessment?

    i. If so, identify that assessment and provide all supporting calculations, data, documents, modeling input and output files, and work papers associated with that assessment.

c. Identify the date when APS decided to proceed with the SCR project.

d. Identify and produce any documentation of APS's decision to proceed with the SCR project.

e. Identify the date when the Engineering, Procurement, and Construction ("EPC") contract for the SCR project was entered into by APS.

f. Produce the EPC contract for the SCR project.

g. Identify the earliest and latest date on which APS entered into contracts to purchase the SCR equipment for Four Corners Unit 5.

h. Identify the earliest and latest date on which APS entered into contracts to purchase the SCR equipment for Four Corners Unit 4.

i. Identify the date when construction on the SCR project was commenced.

j. Please provide the amount of capital spending, by month, on the SCR project.

k. Please provide the dates that each unit was unavailable due to the SCR installation.

l. Please provide the Company's forecasts of operations and maintenance costs for the SCR produced in 2015 through present (latest available).

Response to SC 1.27:

a. The SCR projects were mandated by the EPA in 2012 as a condition to continue operations of the plant past July of 2018. In anticipation of that federal mandate, the SCRs were included in the analyses filed with the Commission in 2010 when APS sought approval to acquire SCE's share of Four Corners Unit 4 and 5 (Docket No. E-01345A-10-0474). After the EPA's mandate, APS included consideration of the SCRs in its 2013 filing when it sought a determination that the Four Corners acquisition was prudent (Docket No. E-01345A-11-0224). Importantly, the Commission found the acquisition to be prudent while acknowledging that the SCR installation was needed to keep Four Corners running after 2018. This finding necessarily means that prudency of APS's installation of SCRs has already been decided by the Commission. Please also see the Administrative Law Judge's Recommended Opinion and Order (issued November 27, 2018) in Docket No. E-01345A-16-0036 et. al., which recommends the testimony and evidence presented in that case supports a finding that the SCR project was completed in a reasonable, cost-efficient, and prudent manner.

   Installation of the SCRs, in conjunction with the acquisition of SCE's share of Four Corners, allowed APS to maintain generation consistent with the load growth in the Company's service territory. The combination of the Four Corners acquisition and the SCR installation ensures the continued provision of reliable and reasonably priced electricity for the Company's customers. Please also see Decision No. 74876.

b. Please see the Company's response to SC 1.27.a.

c. The SCR project was an integral part of the Company's acquisition of SCE's portion of Four Corners Units 4 and 5, which closed on December 31, 2013.

d. Please see the following attached documents:

Purchase and Sale Agreement (between SCE and APS for a portion of Four Corners Units 4 and 5)	APS19RC00767
Consent Decree (USA/EPA v. APS et.al.)	APS19RC00768

Response to SC 1.27 (continued):

Source Specific Federal Implementation Plan (FIP) for Four Corners (as published in the Federal Register)	APS19RC00769

e. The Four Corners SCR Engineering, Procurement, and Construction (EPC) contract was executed on August 27, 2015.

f. The EPC contract is attached as ASP19RC00772. This contract is Highly Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

g. Pursuant to the EPC contract, APS did not contract directly for any SCR equipment.

h. Please see the Company's response to SC 1.27.g.

i. Construction on the Four Corners SCR project began on September 14, 2015.

j. Please see the attached spreadsheet ExcelAPS19RC00770.

k. Four Corners Unit 5 was unavailable due to SCR construction from September 16, 2017 through December 17, 2017. Four Corners Unit 4 was unavailable due to SCR construction from January 20, 2018 through April 24, 2018.

l. Please see the attached document APS19RC00771 for the requested O&M forecasts.

SIERRA CLUB'S SECOND SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
DEVELOP A JUST AND REASONABLE RATE OF RETURN
DOCKET NO. E-01345A-19-0236
APRIL 8, 2020

SC 2.1: Refer to "SC 1.23_APS19RC00762_2012 IRP Excerpts_CONF", "SC 1.23_APS19RC00717_APS 2014 IRP - CONF PORTION" and "SC 1.23_APS19RC00718_APS 2017 IRP - CONF".

a. For every portfolio and sensitivity modeled in the 2014 and 2017 IRPs, please provide the annual revenue requirements for all years modeled and preferably in Excel format.

b. For every portfolio and sensitivity modeled in each (2012, 2014, and 2017) IRP, please provide the following on an annual basis for Four Corners units 4 and 5 (separately for each unit, where available) for all years modeled and preferably in Excel format:

i. Capacity factor (%)
ii. Capacity (MW)
iii. Generation (MWh)
iv. Fixed O&M ($/MW)
v. Variable O&M ($/MWh)
vi. Capital expenditures ($)
vii. Coal burn (MMBtu)
viii. Fuel cost ($), including a breakdown of fixed and spot purchases (if applicable)
ix. Lease costs ($)
x. Revenue requirement ($), including supporting calculations

Initial Response: APS objects to this request as unduly burdensome and not proportional to the needs of this case. In addition, the request is overly broad and duplicative. APS has already provided extensive information to the Sierra Club, including information regarding its prior IRPs. APS also objects to the extent this request seeks to have APS conduct new model runs or new analysis. APS has no obligation to create new documents or conduct analysis for Sierra Club. Subject to and without waiving its objections, APS will provide responsive information.

Supplemental Response:

a. Please see the attachments listed below for the annual revenue requirements of every portfolio modeled in the 2017 IRP. The information in the spreadsheets provided in response to this subpart is Confidential and is being provided pursuant to an executed Protective Agreement in this docket. Please note that all of the requested information for the 2014 IRP is available within that IRP, as provided in the Company's response to SC 1.23.

Supplemental Response to SC 2.1 (continued):

CarbonReduction TOTAL REV REQ	ExcelAPS19RC01237
EnergyStorageSystems TOTAL REV REQ	ExcelAPS19RC01238
ExpandedDSM TOTAL REV REQ w TRC	ExcelAPS19RC01239
ExpandedRenewable TOTAL REV REQ	ExcelAPS19RC01240
FlexibleResourceSELECTED TOTAL REV REQ	ExcelAPS19RC01241
NuclearSMR TOTAL REV REQ	ExcelAPS19RC01242
ResourceMandates TOTAL REV REQ w TRC	ExcelAPS19RC01243

b. Information for each of the subparts i. through x. is provided for Four Corners Units 4 and 5 combined, for each portfolio modeled in the 2012, 2014, and 2017 IRPs as indicated in the table below. The information in the spreadsheets provided in response to this subpart is Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

	2012 IRP	2014 IRP	2017 IRP
i. Capacity factor (%)	ExcelAPS19RC01244	ExcelAPS19RC01247	ExcelASP19RC01250
ii. Capacity (MW)	ExcelAPS19RC01244	ExcelAPS19RC01247	ExcelAPS19RC01250
iii. Generation (MWh)	ExcelAPS19RC01244	ExcelAPS19RC01247	ExcelAPS19RC01250
iv. Fixed O&M ($/MW)[1]	ExcelAPS19RC01244	ExcelAPS19RC01247	ExcelAPS19RC01250
v. Variable O&M ($/MWh)[2]	ExcelAPS19RC01244	ExcelAPS19RC01247	ExcelAPS19RC01250
vi. Capital expenditures ($)	ExcelAPS19RC01245	ExcelAPS19RC01248	ExcelAPS19RC01251
vii. Coal burn (MMBtu)[3]	ExcelAPS19RC01246	ExcelAPS19RC01249	ExcelAPS19RC01252
viii. Fuel cost ($)[4]	ExcelAPS19RC01244	ExcelAPS19RC01247	ExcelAPS19RC01250
ix. Lease costs ($)[5]	ExcelAPS19RC01244	ExcelAPS19RC01247	ExcelAPS19RC01250
x. Revenue requirement ($)	ExcelAPS19RC01244	ExcelAPS19RC01247	ExcelAPS19RC01250

[1] Provided in millions of dollars. Cost in $/MW can be calculated using $millions and information provided in ii. Capacity (MW). Values in $/MW are also provided in the IRPs, Attachment D.1(a)(6).
[2] Provided in millions of dollars. Cost in $/MWh can be calculated using $millions and information provided in iii. Generation (MWh). Values in $/MWh are also provided in the IRPs, Attachment D.1(a)(1).
[3] Provided in tons. Coal Burn (MMBtu) can be calculated from tons and heating value (MMBtu/ton) which is also provided.
[4] See also IRP_CoalBurn_LDs attachments in each IRP year for liquidated damages which were not included in this attachment.
[5] Plant Lease costs are included in and inseparable from "Fixed Fuel and O&M".

SIERRA CLUB'S SECOND SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
DEVELOP A JUST AND REASONABLE RATE OF RETURN
DOCKET NO. E 01345A 19 0236
APRIL 8, 2020

SC 2.3: Refer to "SC 1.4 APS19RC00886 HIGHLY CONF Coal Supply Agreement."

a. Has this coal contract (including any amendments) been approved by the Commission? Please explain.

b. Through what mechanisms does APS anticipate recovering from ratepayers APS's share of the cost of coal supplied under this contract? If through APS's "power supply adjustor," please provide a breakdown of the costs APS has included in the adjustor for 2019 and 2020 specific to recovery of APS's share of costs under this coal contract.

c. At page p.43, Section 17.1, the contract states that [redacted]

i. [redacted]

ii. [redacted]

d. Refer to Section 4.4c.

i. [redacted]

SC 2.3 (continued):

ii.

e. Refer to Section 6.1.

i. Please provide what APS has paid so far in terms

ii. Please provide what APS has paid so far that is in addition

iii. Please provide APS's forecast for the annual costs it will pay

iv. Please provide APS's forecast for the annual costs it will pay on this contract,

f. Refer to SC 1.4_APS19RC00886_HIGHLY CONF_Coal Supply Agreement, Section 20.

i. Please provide any estimates that APS has conducted or reviewed on the costs

ii. Please provide any estimates that APS has conducted or reviewed on

iii. Please explain if APS would still have in the event of a shut down before the end of the contract term.

Initial Response: Subject to and without waiving the objections below, APS will produce responsive information. APS objects to this data request as unduly burdensome and not proportional to the needs of this case. In addition, the request seeks information that is immaterial to the issues presented in this proceeding. As to request 2.3(c), APS also objects because it seeks a legal interpretation and conclusion and calls for

Response to SC 2.3 (continued): Agreement speaks for itself. Finally, APS objects to the extent that this request seeks information that is protected by the attorney client privilege or work product doctrine.

Supplemental Response:

a. No. Commission approval is not a required for APS, or any other electric utility, to sign fuel contracts. APS is subject to periodic fuel audits where the Commission reviews APS's fuel contracts.

b. APS collects fuel costs, including coal, through base fuel expense, which is set in a rate case, and its Power Supply Adjustor, which operates according to its Plan of Administration. Please see table below. Please also note that 2020 data will be available subsequent to public release of information through the Company's 10-Q filings.

Cost Category	**2019 CSA Costs ($000)**
FC 4 APS Coal Fuel	$ 116,195
FC 5 APS Coal Fuel	$ 92,171
APS share of Four Corners common costs	$ 547
Total	$208,913

c. Please see the Company's Initial Response to SC 2.3.

d. i. Please see attachment APS19RC01236, which is Confidential and is being provided pursuant to an executed Protective Agreement.

ii. Please see attachment APS19RC01236, which is Confidential and is being provided pursuant to an executed Protective Agreement.

e. i. Please see attachment APS19RC01236, which is Confidential and is being provided pursuant to an executed Protective Agreement.

ii. Please see attachment APS19RC01236, which is Confidential and is being provided pursuant to an executed Protective Agreement.

iii. Please see attachment APS19RC01236, which is Confidential and is being provided pursuant to an executed Protective Agreement

Response to SC 2.3 (continued):

iv. Please see attachment APS19RC01236, which is Confidential and is being provided pursuant to an executed Protective Agreement

f.

i. The study estimating early closure effects on Final Reclamation Costs is attached as APS19RC01223.

ii. The most recent estimate of the "Seller's Stranded Costs" is attached as ExcelAPS19RC01224.

iii. No. Under this hypothetical, APS might consider exercising a contractual provision that allows for a 24-month notice to terminate if the plant is closed prior to 2031.

Second Supplemental Response:

b. While preparing this second supplemental response, APS discovered the table originally provided for part b included first quarter 2020 information. As a result, the table below was corrected to show 2019 information as previously noted.

Cost Category	**2019 CSA Costs ($000)**
FC 4 APS Coal Fuel	$ 92,966
FC 5 APS Coal Fuel	$ 77,520
APS share of Four Corners common costs	$ 524
Total	$171,010

Please see below for year-to-date June 30,2020 information.

Cost Category	**Jan-June 2020 CSA Costs ($000)**
FC 4 APS Coal Fuel	$ 36,598
FC 5 APS Coal Fuel	$ 27,880
APS share of Four Corners common costs	$ 236
Total	$ 64,714

Third Supplemental Response:

f. i. Upon further review, APS has determined that the previously provided document APS19RC01226 is Confidential. Please destroy all prior copies and replace with the attached document APS19RC01226A, which contains the exact same information but is correctly labeled as Confidential. Please note because this document is Confidential, it is being provided pursuant to an executed Protective Agreement in this case.

NTEC
Schedule of Sellers stranded costs

Fiscal Year Ending 12/31	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Sustaining Capex																
CapEx (15 Year Book Life)		3,854	1,171	3,901	-	-	-	-	-	-	-	-	-	-	-	-
CapEx (10 Year Book Life)		24,410	7,418	24,707	10,500	7,500	7,500	7,500	7,500	11,250	11,250	-	-	-	-	-
CapEx (5 Year Book Life)		3,854	1,171	3,901	3,500	2,500	2,500	2,500	2,500	3,750	3,750	5,000	3,000	3,000	3,000	-
Total CapEx Additions		32,119	9,761	32,509	14,000	10,000	10,000	10,000	10,000	15,000	15,000	5,000	3,000	3,000	3,000	-
Depreciation																
Book Depreciation (For Assets Acquired after 12/31/2016)		2,655	3,056	8,032	11,245	12,903	13,224	13,224	13,210	12,740	13,157	13,007	12,131	10,056	8,580	6,665
Book Depreciation (For Assets Acquired Before 12/31/2016)		9,564	6,617	3,617	2,616	2,372	1,586	1,342	1,214	1,133	1,063	846	829	768	502	110
Other																
Total Depreciation		12,219	9,673	11,649	13,861	15,274	14,810	14,566	14,425	13,873	14,220	13,853	12,959	10,824	9,082	6,776
PPE balance:																
Beginning balance		35,760	55,660	55,749	76,609	76,748	71,474	66,665	62,099	57,674	58,801	59,582	50,729	40,769	32,946	26,864
Additions		32,119	9,761	32,509	14,000	10,000	10,000	10,000	10,000	15,000	15,000	5,000	3,000	3,000	3,000	-
Depreciation		(12,219)	(9,672)	(11,649)	(13,861)	(15,274)	(14,810)	(14,566)	(14,425)	(13,873)	(14,220)	(13,853)	(12,959)	(10,824)	(9,082)	(6,776)
Ending balance	35,760	55,660	55,749	76,609	76,748	71,474	66,665	62,099	57,674	58,801	59,582	50,729	40,769	32,946	26,864	20,088

SIERRA CLUB'S THIRD SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
DEVELOP A JUST AND REASONABLE RATE OF RETURN
DOCKET NO. E-01345A-19-0236
JUNE 9, 2020

Sierra Club 3.1: Refer to SC 2.3_APS19RC01236_FC Coal Cost Information and Forecasts_CONF and SC 2.3_ExcelAPS19RC01224_Sellers Stranded Costs 2019.

a. Please confirm that the [redacted] in every year shown, are unavoidable if APS were to terminate the contract prior to 2031.

i. If any of these costs are avoidable if APS were to terminate the contract prior to 2031, please specify which costs would be avoidable, relative to the termination date—for each year after 2020 that APS could terminate the contract.

b. Do any of the costs shown in SC 2.3_ExcelAPS19RC01224_Sellers Stranded Costs 2019 overlap with those shown in SC 2.3_APS19RC01236_FC Coal Cost Information and Forecasts_CONF?

c. If so, please specify which costs are included in both.

d. Please provide what amount of the stranded costs shown in SC 2.3_ExcelAPS19RC01224_Sellers Stranded Costs 2019 that APS would need to pay if it were to terminate the contract—for each year after 2020 that APS could terminate the contract.

Response: a. Not all costs listed are unavoidable if the contract were to terminate prior to 2031.

i. APS Fuel Cost, LD Price and Performance Bond costs are avoidable if APS exercised the contractual provision that allows for a 24-month notice to terminate if the plant is closed prior to 2031.

b. There are no cost overlaps between the two cost estimations.

c. N/A

d. Please see the table below.

Response to SC 3.1 (continued):

Date	APS Share of Expected Termination Expense
7/1/2020	$48,351,486
7/1/2021	$45,028,805
7/1/2022	$41,998,645
7/1/2023	$39,122,324
7/1/2024	$36,334,722
7/1/2025	$37,044,832
7/1/2026	$37,536,409
7/1/2027	$31,959,153
7/1/2028	$25,684,685
7/1/2029	$20,755,739
7/1/2030	$16,924,188
7/6/2031	$12,787,096

SIERRA CLUB'S SIXTH SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
DEVELOP A JUST AND REASONABLE RATE OF RETURN
DOCKET NO. E-01345A-19-0236
JULY 23, 2020

SC 6.1: Refer to SC 1.16_ExcelAPS19RC00885 and SC 1.16_ExcelAPS19RC00884A.

a. Please provide the dates that these forecasts were produced by or for the Company.

b. As Sierra Club requested informally on July 15, please confirm that APS does not have any more recent forecasts that would be responsive to SC 1.16.

i. If not confirmed, please provide a supplemental response to SC 1.16 based on the most recent forecast produced by or for the Company.

Response:

a. Information in these forecasts was produced between the third quarter of 2016 and the third quarter of 2019.

b. The forecasts were updated in the Company's 2020 Integrated Resource Plan which was filed June 26, 2020 in Docket No. E00000V-19-0034.

i. Please see APS's third supplemental response to SC 1.16.

Witness: Brad Albert

SIERRA CLUB'S SIXTH SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
DEVELOP A JUST AND REASONABLE RATE OF RETURN
DOCKET NO. E-01345A-19-0236
JULY 23, 2020

SC 6.4: Refer to Citizen Groups 2.13_APS19RC01444_2020 Confidential IRP_CONF.

a. Does the fixed O&M shown for Four Corners Units 4 and 5 include "fixed fuel" costs?

   i. If not, please provide annual fixed fuel costs.

b. Please provide the pre-tax rate of return assumed in the 2020 IRP.

c. Please provide all projected costs at Four Corners Units 4 and 5 for each portfolio and scenario in the 2020 IRP, including supporting calculations.

d. Please provide projected annual revenue requirements for Four Corners Units 4 and 5 for each portfolio and scenario in the 2020 IRP, including supporting calculations.

e. Please provide projected levelized costs of Four Corners Units 4 and 5 for each portfolio and scenario in the 2020 IRP, including supporting calculations.

Response:

a. Yes.

b. The pre-tax rate of return assumed in the 2020 IRP is 10.07%.

c. Please see Attachments APS19RC01800 through APS19RC01820 for Four Corners 4 and 5 annual costs and revenue requirements for each portfolio and scenario in the 2020 IRP. Note that annual capital additions are provided in response to SC 6.1. Liquidated damages associated with the coal contract are not included in the revenue requirements and are provided in Attachment APS19RC01821.

   Please note the information in these attachments is Confidential and is being provided pursuant to an executed Protective Agreement in this docket.

d. Please see the Company's response to part c.

e. Please see the Company's response to part c.

Witness: Brad Albert

SIERRA CLUB'S SEVENTH SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
DEVELOP A JUST AND REASONABLE RATE OF RETURN
DOCKET NO. E-01345A-19-0236
AUGUST 26, 2020

Sierra Club 7.1: Refer to SC 6.3_APS19RC01796_BDL-4DR FC Projects and SC 6.3_APS19RC01797_BDL-5DR FC Projects.

a. For those projects already in process or completed, could APS have avoided any of the associated spending if—prior to starting each project—APS had decided to retire the Four Corners units at the end of 2023?

i. If so, please identify the costs that could have been avoided for each project. Please provide supporting documentation and analyses used in making this determination.

ii. For all unavoidable spending, please explain why it would be necessary if the units were retired at the end of 2023. Please note, for the purposes of this question, commencement of construction would not make a project unavoidable because the question assumes a 2023 retirement was selected before the project was started.

Response: APS objects to this request as it seeks documents and speculative information that does not exist. The question asks a hypothetical, what if, question about the Four Corners Power Plant and asks APS to speculate about actions it could have taken if the plant were to close in 2023.

In addition, APS objects that this request is unduly burdensome to the extent it asks APS to create information and perform analyses that are not in existence, and the request is irrelevant and immaterial to the extent it seeks information about projects and expenses not in the Test Year or Post-Test Year Plant period. Four Corners Power Plant is a jointly owned plant, operated by APS. Any decisions about retirement or early closure must be made jointly by the co-owners and cannot be made solely by APS. Currently, APS plans to exit the plant in 2031.

CITIZEN GROUPS' SECOND SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
DEVELOP A JUST AND REASONABLE RATE OF RETURN
DOCKET NO. E-01345A-19-0236
JUNE 15, 2020

Citizen Groups 2.12: Provide copies of the output files for APS planning models used in the preparation of the company's 2020 Integrated Resource Plan.

Response: Please see the attached spreadsheets ExcelAPS19RC01441, ExcelAPS19RC01442 and ExcelAPS19RC01443. These spreadsheets are Highly Confidential and are being provide pursuant to an executed Protective Agreement in this docket.

Witness: Brad Albert

CITIZEN GROUPS' SECOND SET OF DATA REQUESTS TO
ARIZONA PUBLIC SERVICE COMPANY REGARDING
THE APPLICATION TO APPROVE RATE SCHEDULES DESIGNED TO
DEVELOP A JUST AND REASONABLE RATE OF RETURN
DOCKET NO. E-01345A-19-0236
JUNE 15, 2020

Citizen Groups 2.14: For each scenario examined in APS's 2020 Integrated Resource Plan please provide the following information for each of Four Corners Units 4 and 5 for each of the years 2020-2038.

a. Annual generation and capacity factors
b. Annual Forced Outage Rates and Equivalent Forced Outage Rates
c. Annual Equivalent Availability Factors
d. Annual fixed O&M expenses
e. Annual non-fuel O&M expenses
f. Annual fuel costs
g. Annual environmental capital investments (CAPEX)
h. Annual non-environmental CAPEX
i. Annual value forecast to be included in APS's rate base

Response: Subject to and without waiving the Objections of Arizona Public Service Company to Citizen Groups Second Set of Data Requests provided on June 29, 2020, APS provides the following response:

This information is Highly Confidential and is being provided pursuant to an executed Protective Agreement in this docket. Please note that the information provided below reflects APS ownership share. Some of the information is available and provided on a unit level, while some is only available and provided at a plant level.

a. Annual generation can be found in the response to Citizen Groups 2.12. Capacity factors can be found in Attachment D.1(A)(2) in the APS 2020 Integrated Resource Plan.

b. The Annual Forced Outage Rate for Four Corners Unit 4 is 11.5% for all years. The Annual Forced Outage Rate for Four Corners Unit 5 is 14.8% for all years.

c. Please see the attached spreadsheet ExcelAPS19RC01445.

d. Annual fixed O&M expenses can be found in Attachment D.1(A)(6) in the APS 2020 Integrated Resource Plan.

e. Annual non-fuel (variable) O&M expenses can be found in the Company's response to Citizen Groups 2.12.

f. Annual fuel costs can be found in the Company's response to Citizen Groups 2.12.

g. Please see the attached spreadsheet ExcelAPS19RC01446. In the IRP, APS does not distinguish between environmental

Response to Citizen Groups 2.14 (continued):

and non-environmental CAPEX.

h. Please see the Company's response to part g.

i. Please see the attached spreadsheet ExcelAPS19RC01447. Please note that this is a planning document and is not used for rate making purposes.

Attachment TC-3

Confidential Discovery Responses

Confidential Information

This file is marked confidential and will be made available for those parties who have signed the Protective Agreement.

Attachment TC-4

Highly Confidential Discovery Responses

Highly Confidential Information

This file contains Highly Confidential Information and will be made available for those parties who have signed the Protective Agreement.