Research Brief: Six Insurmountable Business Risks to Keeping Navajo Generating Station Open Past 2019

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Introduction

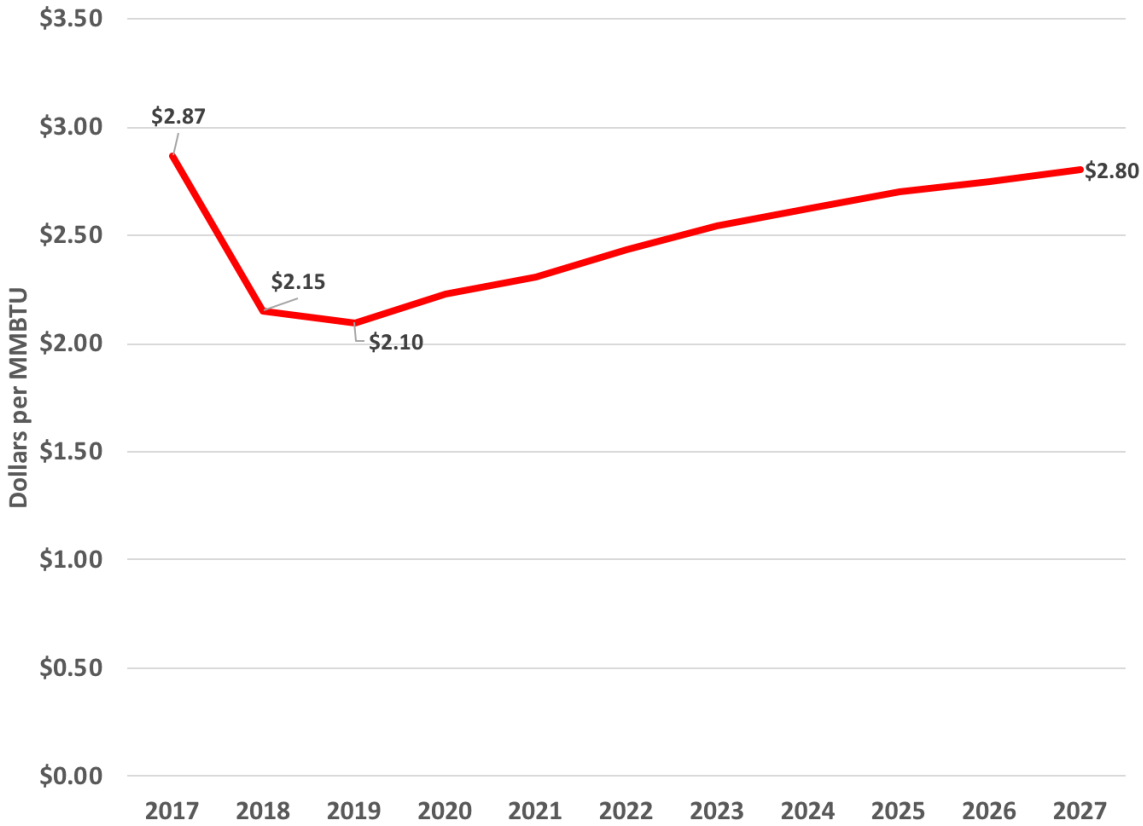
As private talks continue to take place around the idea that Navajo Generating Station (NGS) can be salvaged as a viable business proposition beyond the plant's scheduled shutdown at the end of 2019, it is important to recognize that revenue certainty and/or profits depend on the assumption that the future will be very different from the past: that is, that natural gas and energy market prices will rise significantly instead of remaining low; that plant production costs will fall substantially, reversing past increases; that there are buyers willing to sign long-term contracts to purchase almost all of the power generated by the plant; that costs related to leasing and mine royalties on the Navajo Nation can be cut; and that the use of low-cost renewable resources in the region, particularly solar, will not continue to increase.

Our research indicates that optimism around NGS's potential as a going concern ignores current market forces and technology developments and that any effort to profitably operate the plant after 2019 will be undermined by a complex set of insurmountable economic and financial risks.

Risk No. 1: Continued Low Natural Gas Prices

Natural gas prices at the SoCal Border declined to less than $3 per MMBTU in 2017. Current futures prices show that the market expects gas prices to remain very low for at least the next nine years. This would undermine the profitability of NGS by reducing fuel costs for the natural gas plants with which NGS competes and by keeping energy market prices low.

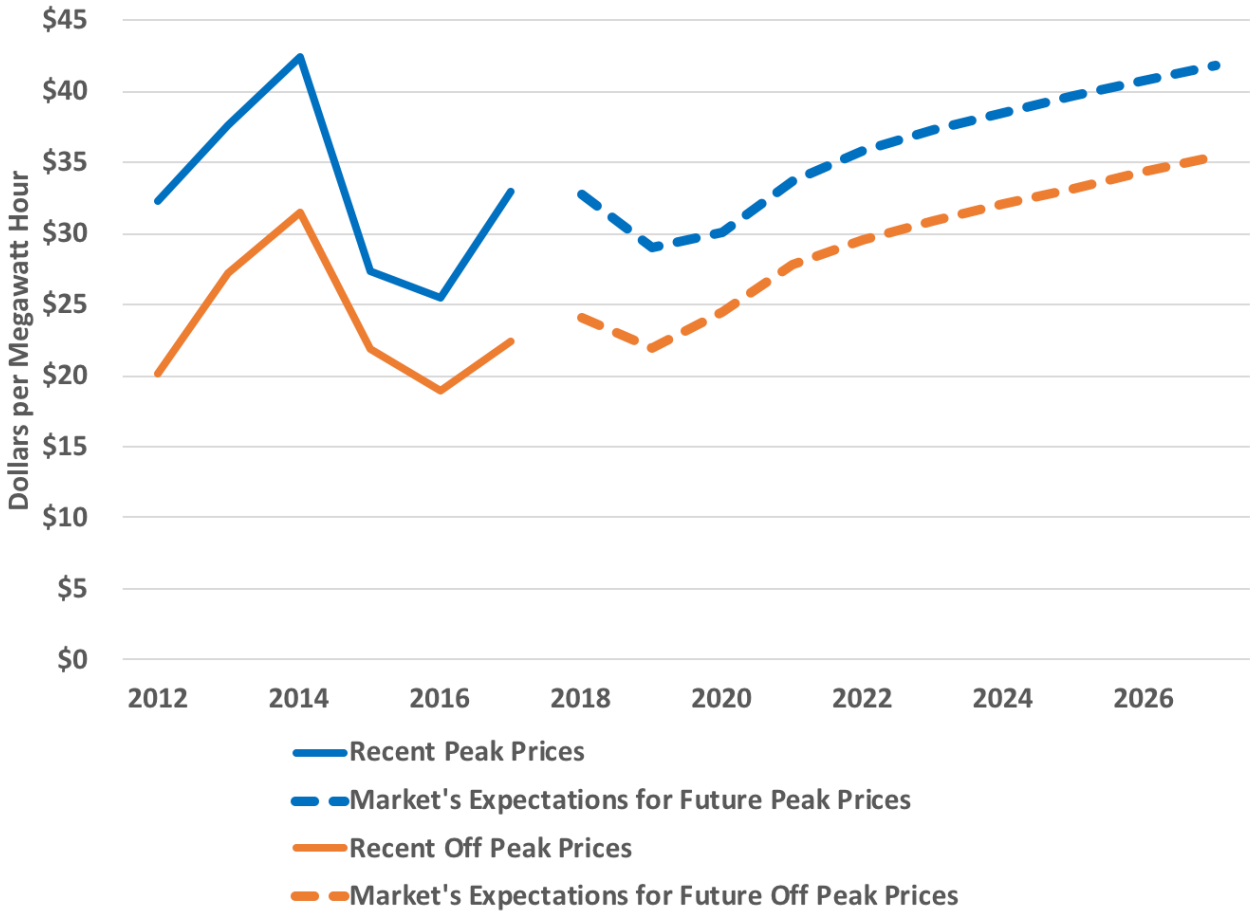
Figure 1: Natural Gas Futures Prices at SoCal Border Hub



Risk No. 2: Continued Low Energy Market Prices

Energy market power prices at the Palo Verde Hub have been low in recent years. Current forward prices show that the market expects these prices to remain flat for the next few years and then increase slowly over time, but remaining relatively low through 2027.

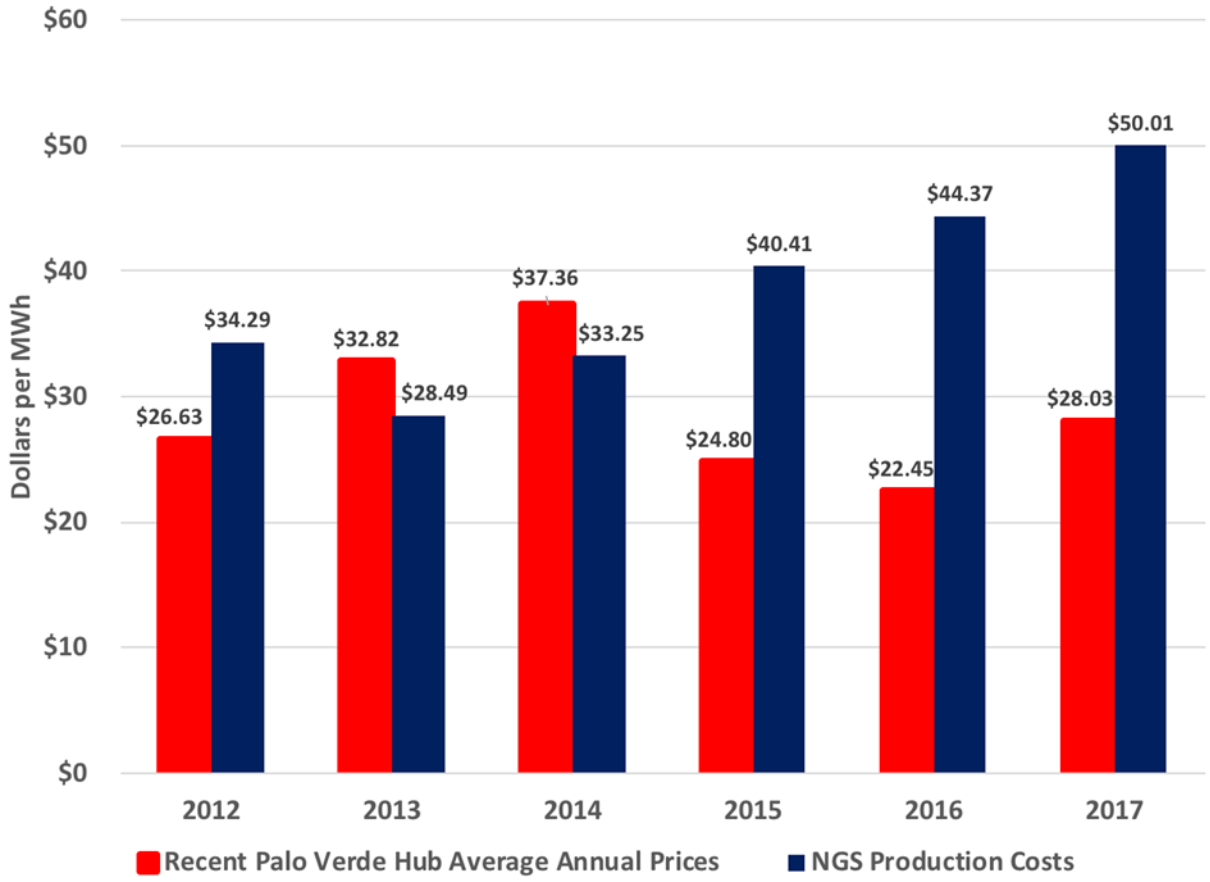
Figure 2: Energy Market Prices at the Palo Verde Hub



Risk No. 3: The Rising Cost of Producing Power at NGS

As reported by the Arizona Public Service Company (APS) in its annual FERC Form 1 filings, the cost of producing power at NGS has increased dramatically, rising by some 75 percent on a per-MWh basis from 2013 to 2017.

Figure 3: Recent NGS Production Costs vs. Palo Verde Hub Prices

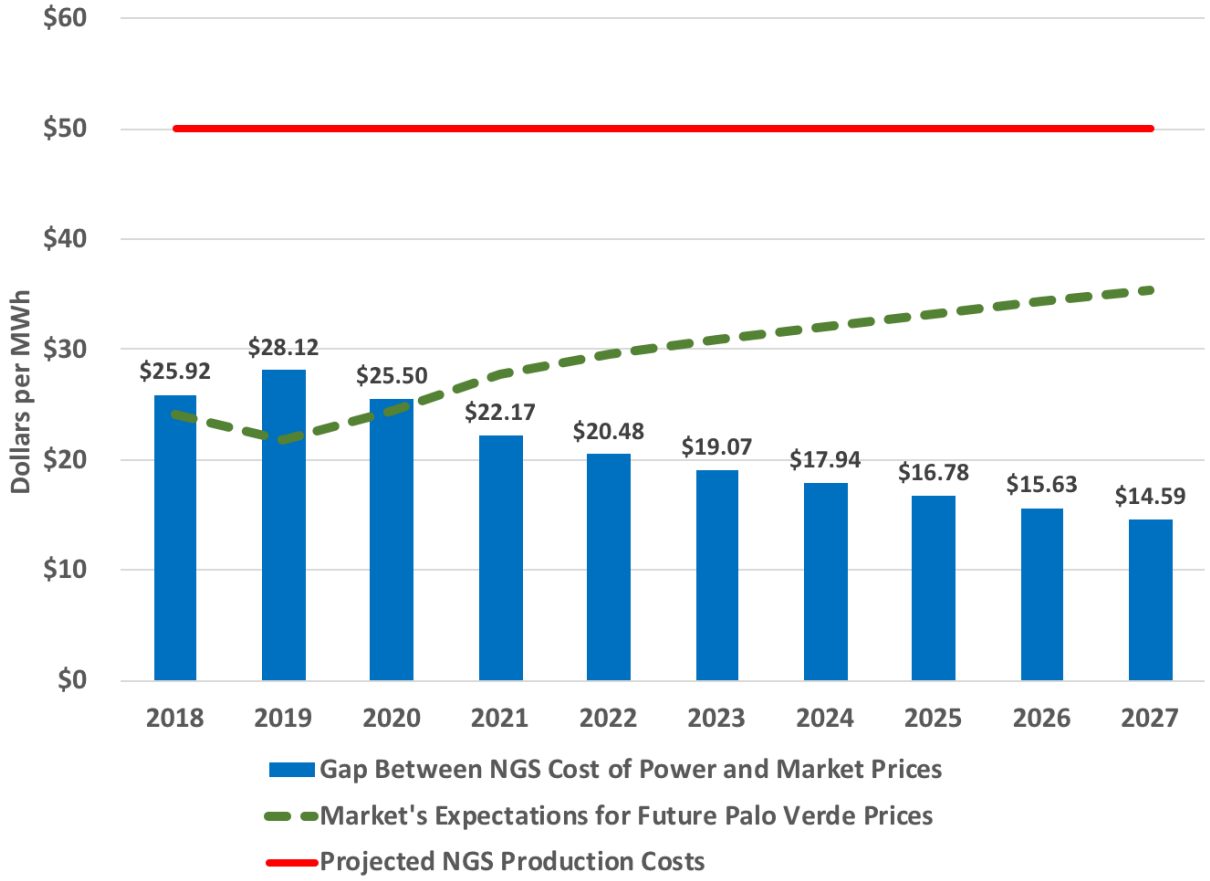


As shown in Figure 3, the average price of power at the Palo Verde hub has exceeded the cost of generating electricity at NGS in only two of the past six years. And over the last three years, the cost of producing power at NGS has been substantially higher than Palo Verde hub prices.

Moreover, the NGS production costs in Figure 3 do not include any of the average $19 million in annual capital expenditures (capex) that the plant owners have been paying in recent years.

Barring reversal of the recent growth in production costs shown in Figure 3—and sharp reductions in those costs—the cost of producing power at NGS will certainly continue to be much higher than the market prices at which that power could be sold at the Palo Verde hub, as shown in Figure 4, on the following page. Although the four current utility owners of NGS have said they'd be willing to consider purchases of NGS power in the future, they also have indicated they will only do so if the pricing is competitive.

Figure 4: The Gap Between Cost of Producing Power at NGS and Palo Verde Hub Energy Market Prices



Note that Figure 4 is based on the conservative assumption that the cost of producing power at NGS will not continue to grow. Nor does it include any annual capex. Figure 4 also does not reflect that the current owners "are deferring – and will continue to defer – significant maintenance of the plant systems and major equipment." This deferral of maintenance will lead to higher production costs for any new owner(s) post-2019.[1]

However, even if an NGS owner were able to eliminate the gaps shown in Figure 4, that achievement would only bring production costs in line with energy market prices.

Indeed, addition cost *reductions* would be needed for NGS to turn a profit.

We see several options for achieving cost reductions of sufficient magnitude to enable any new owner or owners to profitably operate the plant, all of which will bring pain to some party or parties:

- Reduce coal royalties to the Navajo Nation; and reduce NGS lease payments to the Navajo Nation;
- Reduce the number of employees at the plant and/or cut wages and benefits;

[1] April 23, 2018 Letter to Mr. James Carson at the U.S. Department of Interior from Michael Hummel, Deputy General Manager, Resources & Finance, at SRP.

- Reduce the price of coal by: (1) cutting Peabody's margin on each ton of coal bought, (2) by laying off miners and/or reducing wages and benefits; or (3) by reducing taxes on the sale of coal. This latter option would essentially shift revenue burdens to state and/or federal taxpayers;
- A direct multi-billion-dollar bailout from the federal government.

The risk in any of these options is that parties would not be willing to bear such cuts or would be willing to do so for only a short period of time.

Of course, any new owner or owners could seek to reduce production costs by eliminating needed equipment overhauls and maintenance. However, that would work only if the new owner or owners intended to operate NGS for a relatively short period of time. Deferring or eliminating needed maintenance can quickly undermine a plant's operating performance.

Risk No. 4: Growing Competition From Lower-Cost Renewables

Installation costs for new wind and solar capacity have declined steeply in recent years. The average installed cost of wind projects has dropped 33 percent from a peak in 2009/2010.[2] The median installed price for utility-scale solar projects has fallen by two-thirds over the past decade or so.[3] The installed prices for small-scale distributed solar projects have also fallen.[4]

Moreover, the performance of new renewable energy facilities has improved. Wind turbine capacity factors have increased significantly as a result of design improvements such as higher hub heights and larger turbine blades. Solar capacity factors also have improved.

As a result of lower installation costs and better performance, utility-scale solar and wind power purchase agreement (PPA) prices have declined sharply in recent years, making them much more attractive to potential residential, commercial and utility customers in the West and Southwest. From 2009 to 2016, average levelized wind PPA prices fell from $70 per MWh to about $20 from 2009. Average levelized solar PPA prices declined by 75 percent from 2009 to 2016 and were about $35 per MWh for new projects in 2016.

Solar and wind PPA prices have dropped further in 2017 and 2018. In December 2017, Xcel Energy reported that a power-generation solicitation in Colorado drew bids for renewable power that were "incredible."[5] The median bid for wind projects received by Xcel Energy was $18.10 per MWh: for wind-plus-storage projects, the median bid was $21 per MWh; the median bid for solar projects was $29.50 per MW; for solar-plus-storage it was $36 per MWh.

More recently, one of the current NGS owners, NV Energy, has reported plans to add 330 MW of renewable resources no later than 2021. The company also reported that it has received what it termed "staggering" prices in more than 100 bids for biomass, geothermal, solar, wind

[2] 2016 Wind Technologies Market Report, Lawrence Berkeley National Laboratory, August 2017. https://emp.lbl.gov/sites/default/files/2016_wind_technologies_market_report_final_optimized.pdf
[3] Utility-Scale Solar 2016, Lawrence Berkeley National Laboratory, September 2017. https://emp.lbl.gov/publications/utility-scale-solar-2016-empirical.
[4] Tracking the Sun 10, Lawrence Berkeley National Laboratory, September 2017. https://emp.lbl.gov/publications/tracking-sun-10-installed-price.
[5] https://www.utilitydive.com/news/xcel-solicitation-returns-incredible-renewable-energy-storage-bids/514287/.

and battery storage projects in response to a request for proposals. The "amazingly attractive" bids included battery-backed solar projects priced below $30 per MWh.

The risk to NGS from low-cost solar resources is amplified by the growth of the Western Energy Imbalance Market (EIM). The EIM was launched in 2014 to help increase energy dispatch across balancing areas, to reduce the need to curtail renewable generation in CAISO (the California Independent System Operator), and to lower the frequency and magnitude of negative market prices. Two of NGS's current owners, APS and NV Energy, already are active members of the EIM, as are PacifiCorp and several other utilities in the West. The Salt River Project is planning to join in 2020. The EIM provides member utilities access to low-cost solar generation being produced in California in response to the legislative mandates that 33 percent of electricity sales be from renewable sources in 2020 and 50 percent of sales be from renewable resources in 2030. Even more aggressive renewable mandates are under consideration.

However, at the same time that the EIM will bring increasing access to renewable resources to potential buyers of NGS power, it is unlikely to afford any meaningful opportunities to sell NGS power into the California market. Although some potential for such leakage exists, the direct import of fossil-fuel-fired generation into California through the EIM has been reduced by the use of a greenhouse-gas adder to the price of the electricity being offered into the market.

Risk No. 5: Uncertainty About Potential Customers for the Power from NGS

After operating as an efficient baseload plant with annual generation of 16-18 million MWh, NGS's generation has declined substantially in recent years, an uptick in 2017 notwithstanding.

Energy Ventures Analysis, on behalf of Peabody Energy, which operates the mine that supplies NGS, projects that beginning in 2020 NGS will generate about 11-12 million MWh each year through 2030.[6] Even if this projection is accurate, the question remains: Who will purchase this power? The Central Arizona Project (CAP), which currently buys NGS power to run its water pumps, has made it clear that it does not want to and is under no obligation to do so, although it seems willing to contract for some unspecified level of competitively-priced power from the plant post-2019.[7] Apparently the existing owners of NGS have indicated some willingness to buy some power from NGS, although at lower volumes than in the past and for a shorter duration (three to five years).[8]

Who, then, will buy the remaining power from NGS if it costs more than buying power from the energy markets? Lazard has posited that the Arizona Corporation Commission and the U.S. Department of the Interior will step in to provide revenue certainty. This would essentially

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[6] Testimony of Seth Schwartz, President, Energy Ventures Analysis, Inc., House Subcommittee on Energy and Mineral Resources, Hearing on the "The Benefits of the Navajo Generating Station to Local Economies," April 12, 2018, at pages 7 and 10.

[7] Written Testimony of Central Arizona Water Conservation District on the House Natural Resource Committee's Subcommittee on Energy and Mineral Resources Subcommittee hearing on "The Benefits of the Navajo Generating Station to Local Economies," at page 3.

[8] Testimony of George W. Bilicic, Lazard Frerers & Co, LLC, before the U.S. House of Representatives, Committee of Natural Resources, Subcommittee on Energy and Mineral Resources, April 12, 2018, at page 5.

involve requiring utilities in Arizona to buy NGS power, at above-market prices, and to compel CAP to source power from NGS, both, at least in large part, under guaranteed long-term contracts.[9]

These actions would be forcing the customers of Arizona's regulated utilities and CAP to pay higher prices for electricity just to provide revenue certainty to any new NGS owner(s). However, it is unclear as to how willing Arizona's utilities and CAP would be to accede to these demands and for how long.

Whatever happens with efforts to force-feed NGS power to regulated utilities and CAP, a substantial portion of NGS power almost certainly will have to be sold without any revenue certainty in the markets (most likely through the Palo Verde and Mead Hubs). NGS's post-2019 financially viability then ultimately will come down to whether it can produce power at competitive prices. Based on the plant's recent experience and our knowledge of competitive markets, we think this will be an extremely difficult if not impossible feat even if the Navajo Nation, plant and mine workers, and utility and CAP customers are hurt financially in the process.

Risk No. 6: The Need for a NEPA Review May Prevent Operation of NGS for a Sustained Period after December 2019

Any operation of NGS beyond 2019 must undergo a lengthy and uncertain environmental impact statement (EIS) review under the U.S. National Environmental Policy Act (NEPA).[10] The EIS must evaluate the environmental impacts of both continued operation of the NGS power plant, as well as the Peabody-owned Kayenta Mine, its sole supplier of coal.

Preparation of an EIS can take years, a process that could result in at least a temporary shutdown of the entire power plant while the review is being finalized (an EIS for the Four Corners Power Plant and Navajo coal mine that began in 2015 took three years to finalize).

Given that the EIS process for continued operation of NGS has not been started, it is very unlikely that a final review could be issued before December 2019. NGS could be forced to at least temporarily suspend operations until the final EIS/record of decision (ROD) is issued. And it is very likely that an EIS/ROD for the continued operation of NGS and the Kayenta Mine beyond December 2019 would be appealed to federal district court, creating further uncertainty and delay for the plant's continued operations.

As SRP has explained to the Department of Interior:

> With no new owner stepping forward, we are now reaching a period where time is a critical factor in being able to develop and execute the myriad of agreements that would be required for a transaction for the transfer of ownership. At least some of those agreements must be negotiated with the tribes and all of which likely will require federal agency review and approval. Based on our past experience negotiating previous lease agreements and coal contracts, and will the need to comply with federal NEPA and environmental

[9] Id.
[10] Federal Register, Vol. 79, No. 95, Friday, May 16, 2014, at page 28548.

review requirements, we believe that any offer to buy the plant beyond mid-May of this year will face significant challenges in executing the agreements and meeting the requirements by December 22, 2019. As a result, the NGS owners believe that a temporary shutdown of the plant may become unavoidable as the executed Extension Lease provides that there will be no coal combustion at NGS after December 2019. In addition, and as we have clearly stated, the NGS owners are deferring– and will continue to defer– significant maintenance of the plant systems and major equipment as appropriate for a plant intended to operate through December 22, 2019.[11]

[11] April 23, 2018 Letter to Mr. James Carson at the U.S. Department of Interior from Michael Hummel, Deputy General Manager, Resources & Finance, at SRP.

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