A Bad Bet: Owning the Four Corners Coal Plant is a Risky Gamble for the Navajo Nation and the Plant's Other Owners

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Executive Summary

Last July, the Navajo Transitional Energy Company (NTEC) acquired a 7% ownership share of the coal-fired Four Corners Generating Station (Four Corners) from Arizona Public Service Company (APS). APS had purchased the 7% share from El Paso Electric Company when it decided to drop out of the coal plant at the end of 2013.

At Four Corners, Growing Losses

With annual losses of over $20 million, NTEC would lose about $170 million during the years 2020-2027 from its ownership of Four Corners units 4 and 5.

Source: IEEFA analysis

Public documents reveal that NTEC paid approximately $145 million to acquire the 7% share of Four Corners. This includes the $70 million purchase price and $45 million for NTEC's 7% share of the cost of recently added environmental controls. In addition, NTEC paid $30 million it owed to keep open an earlier option to purchase the 7% stake of Four Corners. It also has been reported that while NTEC paid $145 million for its share of Four Corners, APS paid NTEC $45 million in cash to resolve a dispute over coal supplies.[1] This makes the net payment from NTEC to APS about $100 million.

NTEC's $70 million payment for the 7% share of Four Corners[2] represents a very good return for APS, which has reported that the price at which it purchased the 7% of Four Corners from El Paso Electric was "immaterial."[3]

Four Corners has two remaining operating units, 4 and 5, each of which has a full power net capacity rating of 770 megawatts (MW). Four Corner Units 1-3 were retired at the end of 2013. Four Corners now has five owners. APS owns 63% of the plant; Public Service Company of New Mexico (PNM) owns 13%; Salt River Project (SRP) 10%; Tucson Electric Power (TEP) 7%; and the newest owner, NTEC, also now owns 7%.

APS, SRP and TEP also are part of the ownership group that decided in February 2017 to close the Navajo Generating Station (NGS) at the end of 2019 "because of the rapidly changing economics of the energy industry, which has seen natural gas prices sink to record lows and become a viable long-term and economic alternative to coal power."[4] These same changing industry economics (including the rapid growth and declining cost of renewables) that led to the planned closure of NGS a quarter-century early also are undermining the financial viability of Four Corners.

Based on an analysis of financial and plant operating data it is clear that Four Corners has become an increasingly unreliable and expensive source of power, and there is little reason to expect that this will change given the set of risks that the plant currently faces and will continue to face in coming years. As a result, IEEFA estimates that NTEC is likely to incur losses

[1] Farmington Daily Times. NTEC reaches settlement for coal sales to Four Corners Power Plant. August 3, 2018.
[2] Pinnacle West Capital Corporation SEC Form 8-K, dated June 29, 2018.
[3] Pinnacle West Capital Corporation, 2017 Annual Report, pp. 4 and 20.
[4] *SRP Press Release, Owners Vote on Navajo Coal Plant Lease*, February 13, 2017.

of more than $170 million just from owning the plant between 2020 and 2027. And these losses do not reflect the net cost of $100 million that NTEC paid to acquire the plant from APS.

The president and speaker of the Navajo Nation Council have directed NTEC to explore options for the potential purchase of NGS.[5] Four Corners should serve as a costly lesson as to what the Navajo Nation would experience if it decides to acquire NGS too.

Risk No. 1: The Aging of Four Corners Units 4 and 5

Four Corners Unit 4 went into service in July 1969; Unit 5 in July 1970. Thus, the units are 48 and 49 years old, making them among the oldest large coal-fired generating plants (400 MW or larger) still in service in the U.S. In fact, a substantial number of large coal plants younger than Four Corners Units 4 and 5 already have been retired due to failing economics and a number of others are scheduled for retirement over the next four-to-five years.

In fact, of the 32 coal-fired units of 500 MW in size or larger that have been retired, only three were older than 49 when they were retired. The median age of retirement for the 32 units was just 43.[6]

At the same time, 226 coal-fired units of 500 MW in size or larger remain in operation. Yet only 15, or less than 7 percent, are older than Four Corners Units 4 and 5.

Why is the age of a coal plant important? Simply, older plants, on average, tend to cost more to operate and maintain and are less reliable.

For example, analyses by the U.S. Department of Energy's Argonne National Laboratory and the National Energy Technology Laboratory have found that coal plant heat rates increase with plant age, while plant availability declines.[7] A higher heat rate means that the unit burns fuel less efficiently – thereby the plant burns more fuel to produce the same output of electricity which, in turn raises plant fuel and operating costs.

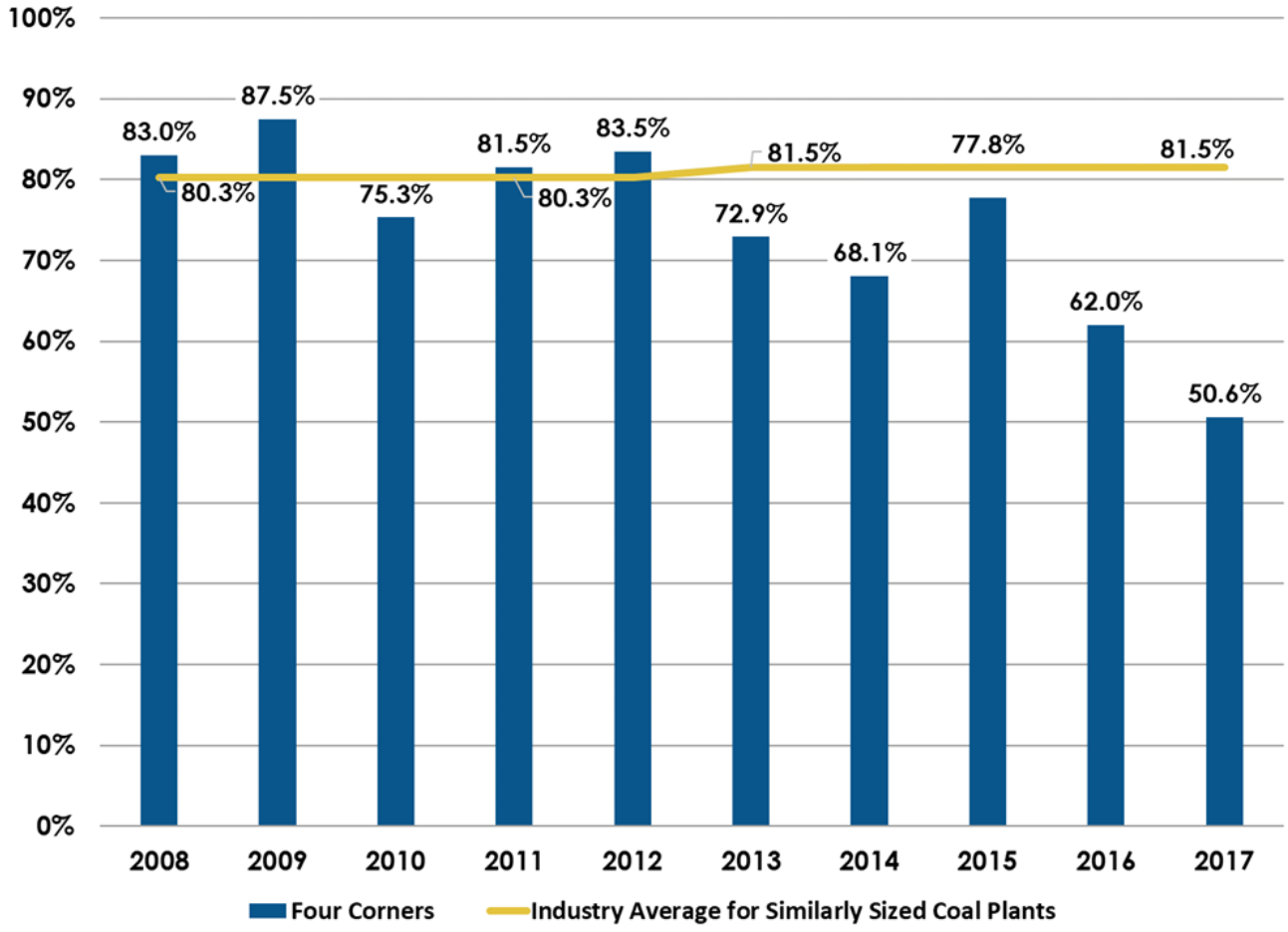
At the same time, older plants tend to cost more to maintain, as equipment and components degrade or fail and must be repaired or replaced.

In addition, older coal plants also tend, on average, to experience more unanticipated problems and have to be shut down more frequently for unplanned outages. A plant's equivalent availability factor (EAF) measures how much a plant operates and takes into account planned and unplanned deratings, providing a meaningful method of tracking plant operations and comparing similar facilities.

As shown in Figure 1, below, Four Corners' annual EAF declined substantially between 2008 and 2017, meaning the units have been available to operate at full power less and less over time. Figure 1 also shows that the EAF at Four Corners is now significantly worse than the average for similarly sized coal units.

[5] *Joint Press Release, Navajo Nation Office of the President and the Vice President and Navajo Nation Office of the Speaker*, November 15, 2018.
[6] Coal plant age data downloaded from S&P Global Market Intelligence on December 3, 2018.
[7] For example, see the *U.S. DOE Staff Report to the Secretary on Electricity Markets and Reliability*, page 155.

Figure 1: Four Corners Annual Equivalent Availability Factors[8]

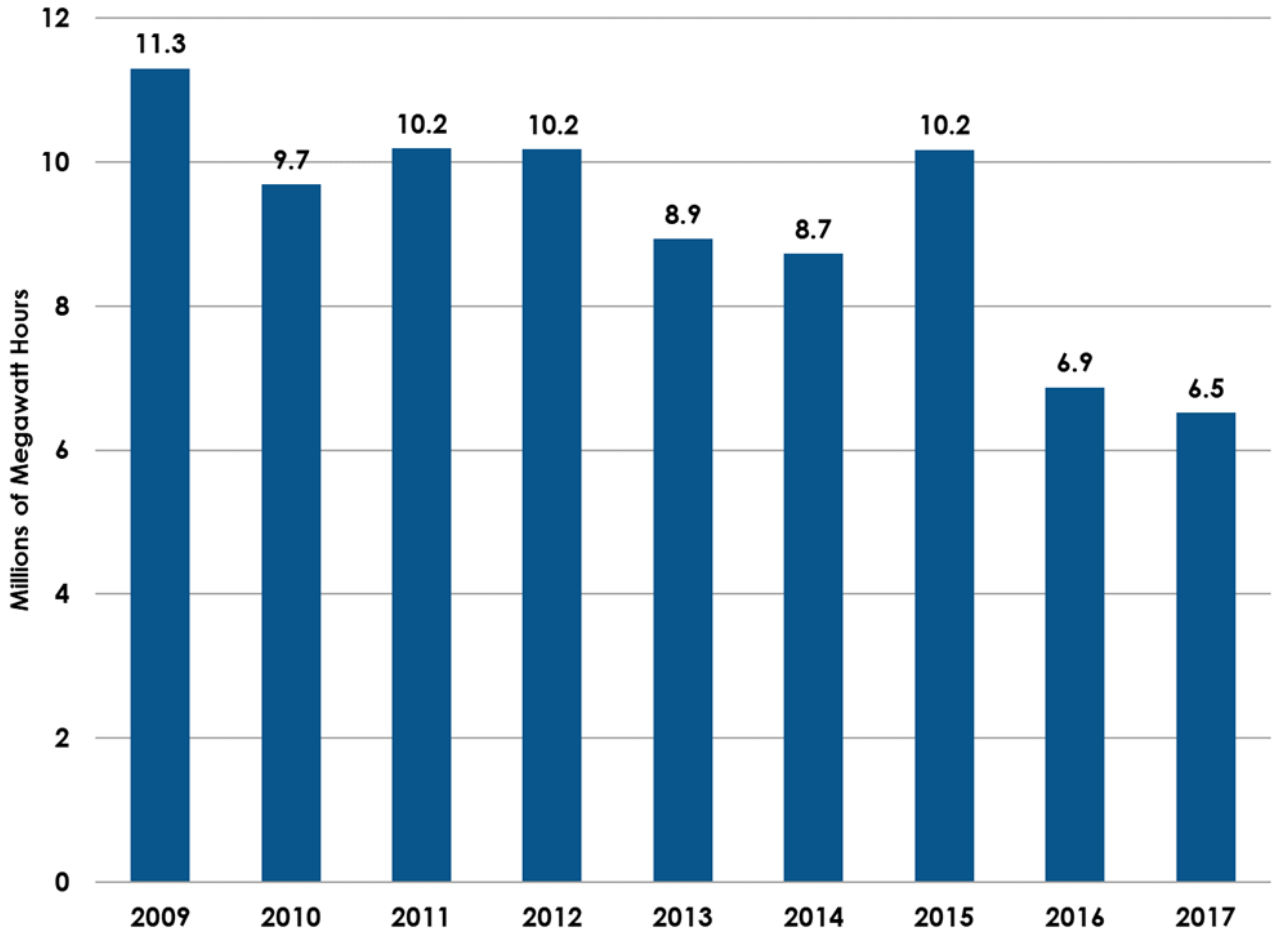


Risk No. 2: The Amount of Electricity Produced by Four Corners Units 4 and 5 Has Declined Substantially Over the Past Decade

The amount of power generated by Units 4 and 5 each year has declined by more than 40% between 2009 and 2017.

[8] EAF data for Four Corners is from Public Service Company of New Mexico FERC Form 1 filings for the years 2009-2017. Industry data is from the North American Electric Reliability Corporation's *Generating Unit Statistical Brochure 4* for the years 2010-2014 and 2013-2017.

Figure 2: Four Corners Annual Generation 2009-2017[9]



The steep drop in generation at Four Corners is due to increased competition from natural gas and renewable resources and the plant's rising cost of producing electricity. None of these factors is likely to abate in the foreseeable future. In fact, they are far more likely to get worse as additional low-cost renewable resources continue to be added to the electric grid and the cost of producing power at Four Corners continues to rise.

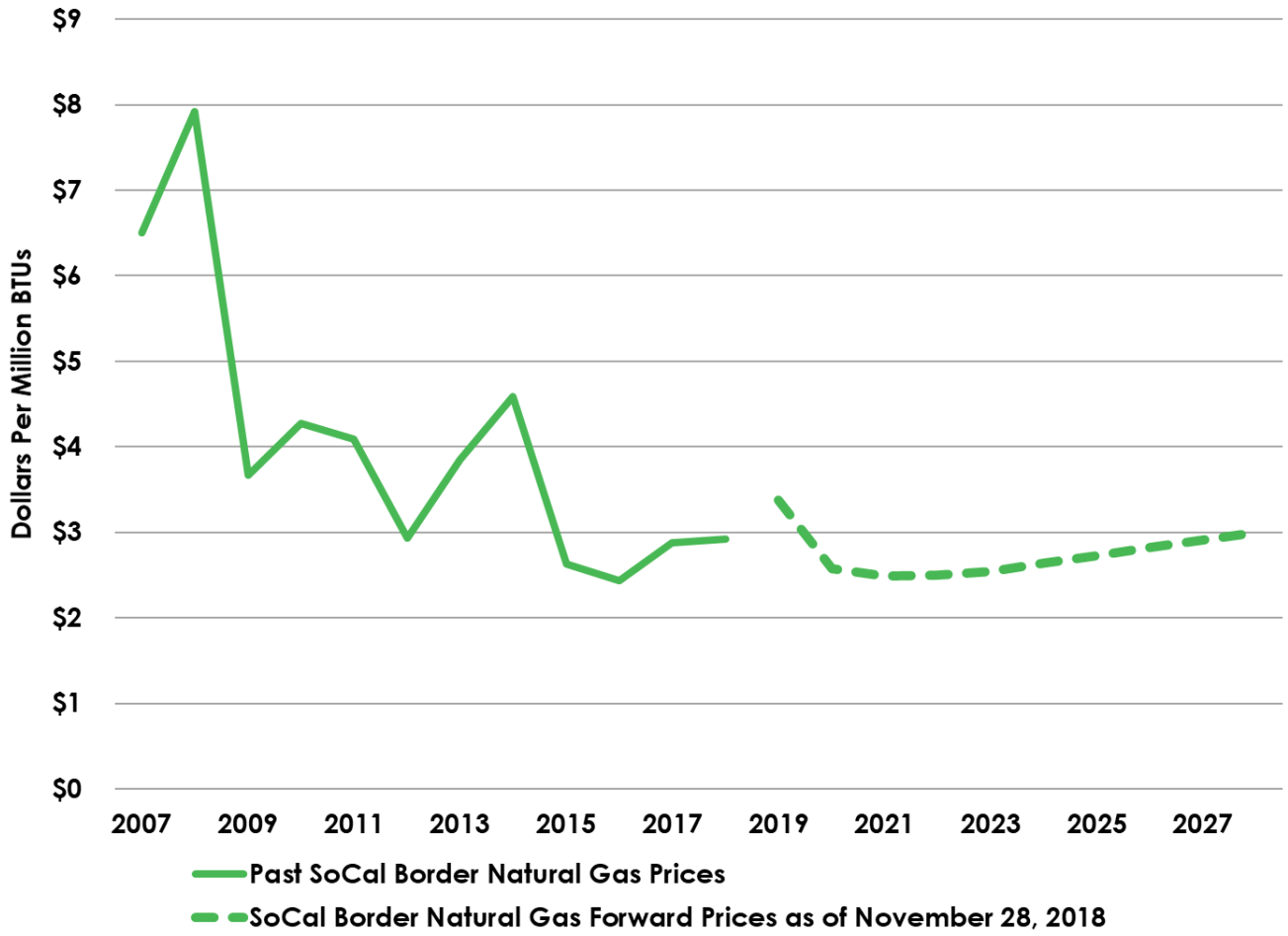
The amount of power generated at Four Corners has continued to decline in 2018 as the two units generated 13% less electricity during the first nine months of this year than they did in the same months in 2017.

Risk No. 3: Continued Low Natural Gas and Energy Market Prices

Similar to what has happened throughout the U.S., natural gas prices at the SoCal Border have declined significantly since 2008 and they are expected to remain low for the foreseeable future. (Figure 3) This has undermined the profitability of Four Corners by reducing fuel costs for the natural gas plants with which the plant competes and by keeping energy market prices low, and will continue to do so in coming years.

[9] Four Corners generation from EIA Form 923 filings.

Figure 3: Natural Gas Prices at SoCal Border Hub, 2007-2027[10]

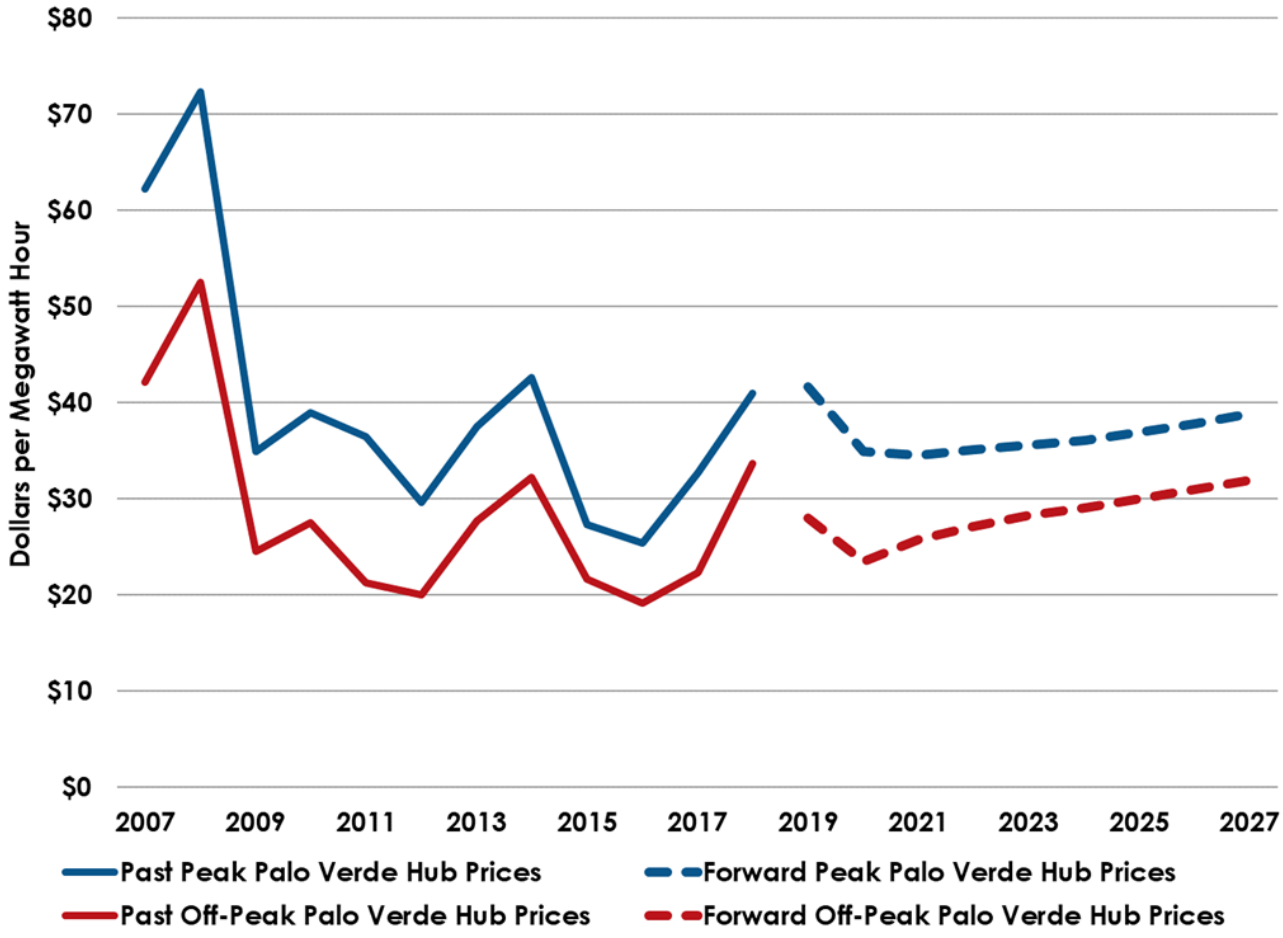


Because they reduce the costs of running gas-fired plants, low natural gas prices adversely impact the profitability of coal plants like Four Corners in two interacting ways. First, low gas prices lead to increased generation at gas-fired plants, thereby displacing generation that otherwise would be produced at Four Corners.

At the same time, low natural gas prices have meant that energy market prices also have been low, and can be expected to remain that way for the foreseeable future.

[10] Past and forward natural gas prices downloaded from S&P Global Market Intelligence.

Figure 4: Energy Market Prices at the Palo Verde Hub 2007-2027



Consequently, not only have coal plants like Four Corners and NGS been generating fewer megawatt hours (MWh), their owners also have been getting less for each MWh they have been able to sell in the markets. Neither of these developments is likely to change going forward.

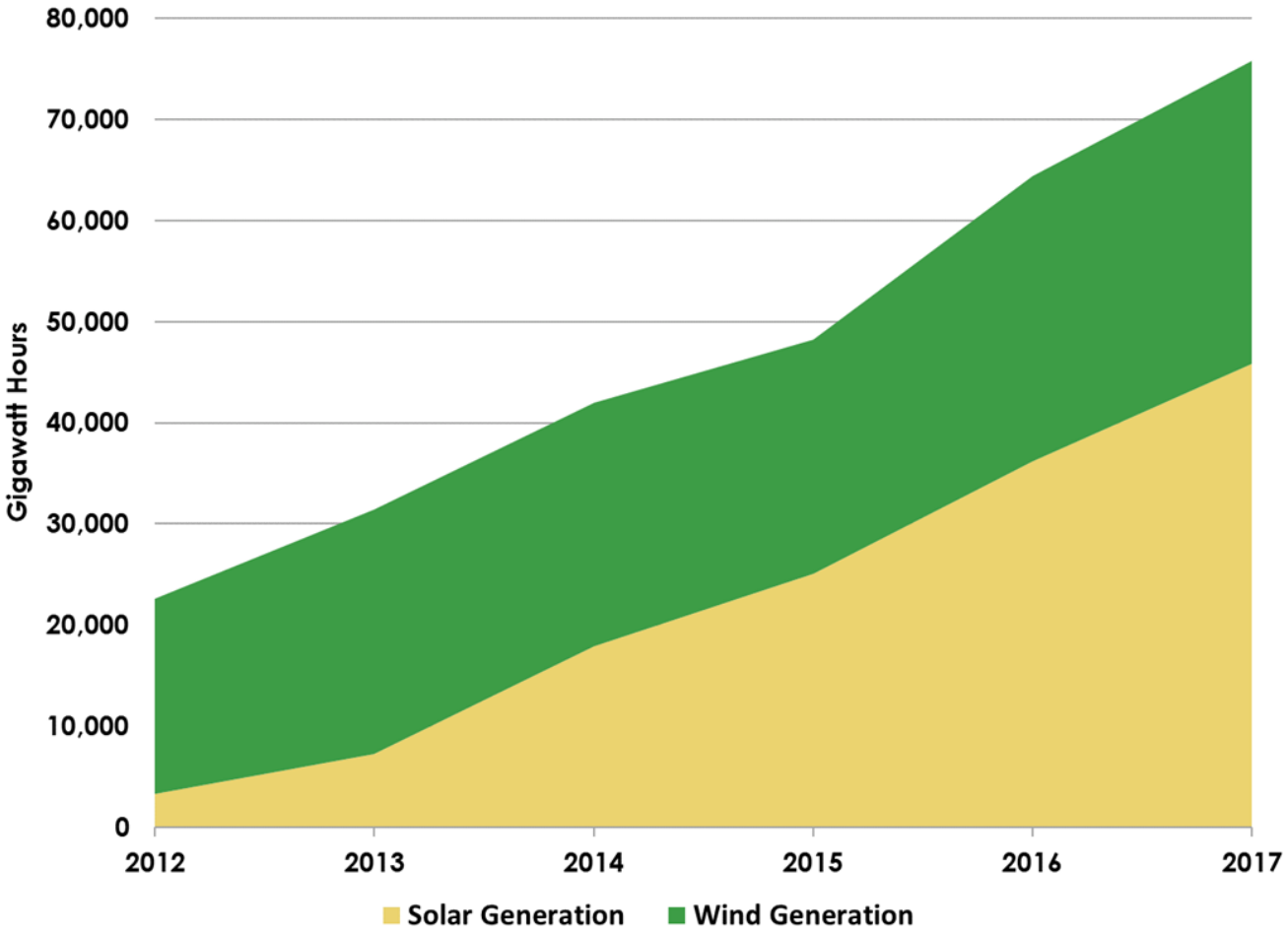
Risk No. 4: Growing Competition from Lower-Cost Renewables

Installation costs for new wind and solar capacity have declined steeply in recent years. The average installed cost of wind projects has dropped 33% from a peak in 2009/2010.[11] The median installed price for utility-scale solar projects has fallen by two-thirds over the past decade or so.[12] The installed prices for small-scale distributed solar projects have also fallen.[13] 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.

[11] Lawrence Berkeley National Laboratory. 2016 Wind Technologies Market Report. August 2017.
[12] Lawrence Berkeley National Laboratory. Utility-Scale Solar 2016. September 2017.
[13] Lawrence Berkeley National Laboratory. Tracking the Sun 10. September 2017.

As a result, as shown in Figure 5, generation from renewable resources has soared in the states near Four Corners: Arizona, California, Colorado, Nevada, New Mexico, and Utah.

Figure 5: Increasing Generation from Wind and Solar Resources



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. Average levelized solar PPA prices declined by 75% from 2009 to 2016 and were about $35 per MWh for new projects in 2016.

Solar and wind PPA prices have dropped further in 2017 and 2018. In December 2017, Xcel Energy reported that a power-generation solicitation in Colorado drew bids for renewable power that were "incredible."[14] 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 MWh; for solar-plus-storage it was $36 per MWh. More recently, other utilities in the Southwest have announced plans to add large amounts of new renewable capacity. For example, last month SRP announced plans to add 1,000MW

[14] Utility Dive. Xcel solicitation returns 'incredible' renewable energy, storage bids. January 8, 2018.

of new solar resources by 2025.[15] Similarly, last spring, Nevada Energy, announced plans to add 1,000MW of new solar resources plus 100MW of battery storage, all by 2021.[16]

When it announced its plans for new solar last spring, NV noted that it had received what it termed "staggering" prices in more than 100 bids for biomass, geothermal, solar, wind 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.

In fact, new PPAs for solar energy in the southwest have been signed at record low prices. For example, the Central Arizona Project (CAP) signed a twenty-year PPA for solar energy at a price of $24.99 per MWh.[17] Shortly after CAP announced that PPA, NV Energy announced that it had agreed to a 300MW solar PPA at $23.76 for 25 years.[18]

The risk to Four Corners 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. One of Four Corners' current owners, APS, already is a member of the EIM, as are PacifiCorp and several other utilities in the West. Two other Four Corners owners, the Salt River Project and Public Service Company of New Mexico, are planning to join in 2020 and 2021, respectively. The EIM provides member utilities access to low-cost solar generation being produced in California in response to the legislative mandates that 33% of electricity sales be from renewable sources in 2020 and 60% of sales be from renewable resources in 2030.

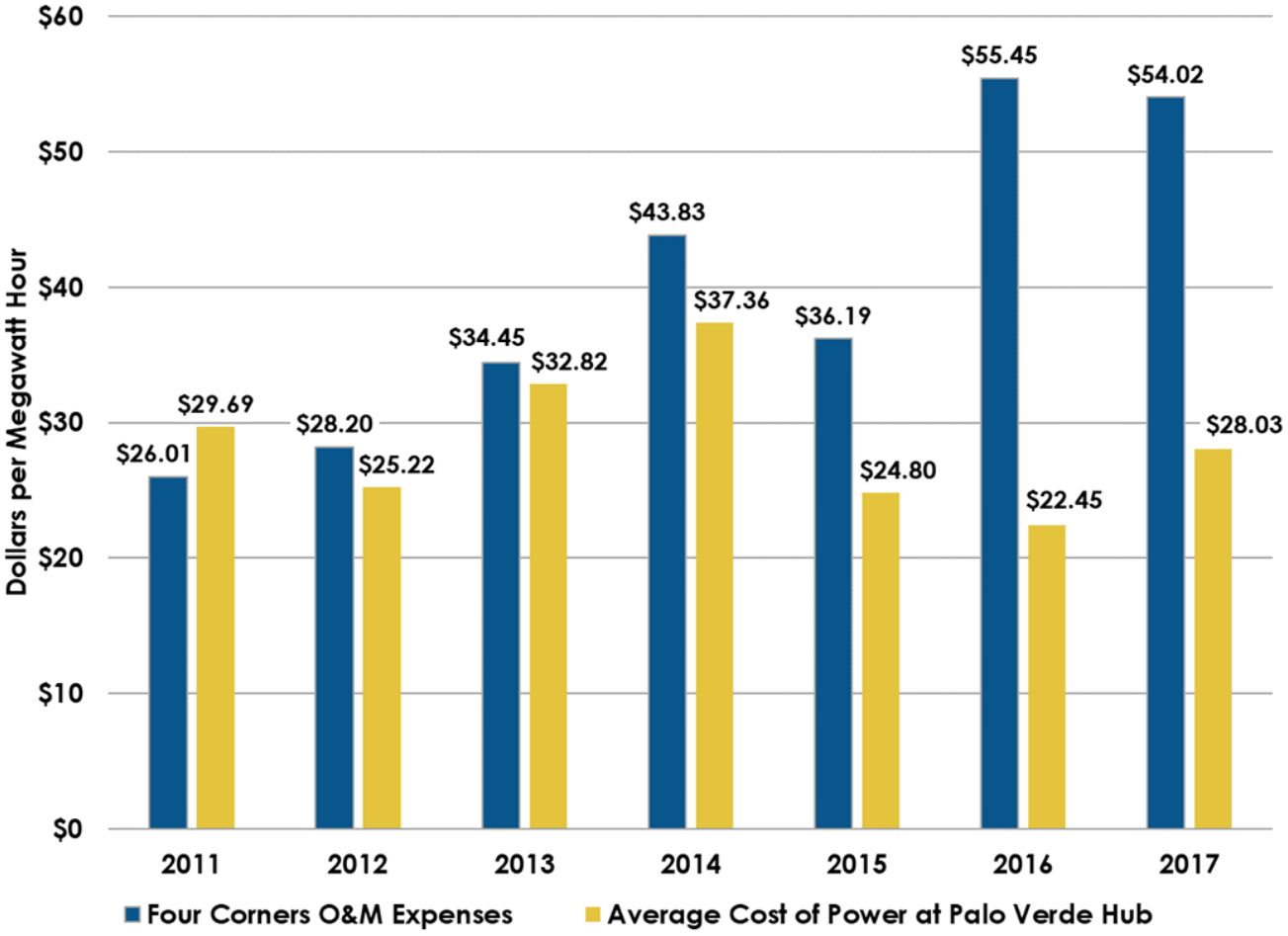
However, at the same time that the EIM will bring increasing access to renewable resources to potential buyers of Four Corners power, it is unlikely to afford any meaningful opportunities to sell power from the plant into the California market. Although some potential for such leakage exists, the direct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

Risk No. 5: The High Cost of Producing Power at Four Corners

As reported by APS in its annual FERC Form 1 filings, the cost of producing power at Four Corners Units 4 and 5 has increased dramatically, almost doubling on a per-MWh basis from 2012 to 2017. Part of this increase has been due to the plant's decline in generation, shown in Figure 2, above, as its fixed operating costs are spread over fewer MWhs of output.

[15] *SRP Plans 1,000 Megawatts of New Solar Energy by 2025*. November 15, 2018.
[16] Greentech Media. NV Energy Contracts to Build More Than 1,000MW of New Solar, 100MW of Battery Storage. May 31, 2018.
[17] Greentech Media. Arizona Water Provider Approves Record-Low-Cost Solar PPA to Replace Coal. June 8, 2018.
[18] Utility Dive. NV Energy 2.3-cent solar contract could set new price record. June 13, 2018.

Figure 6: Recent Four Corners Units 4 and 5 Production Costs vs. Palo Verde Hub Prices

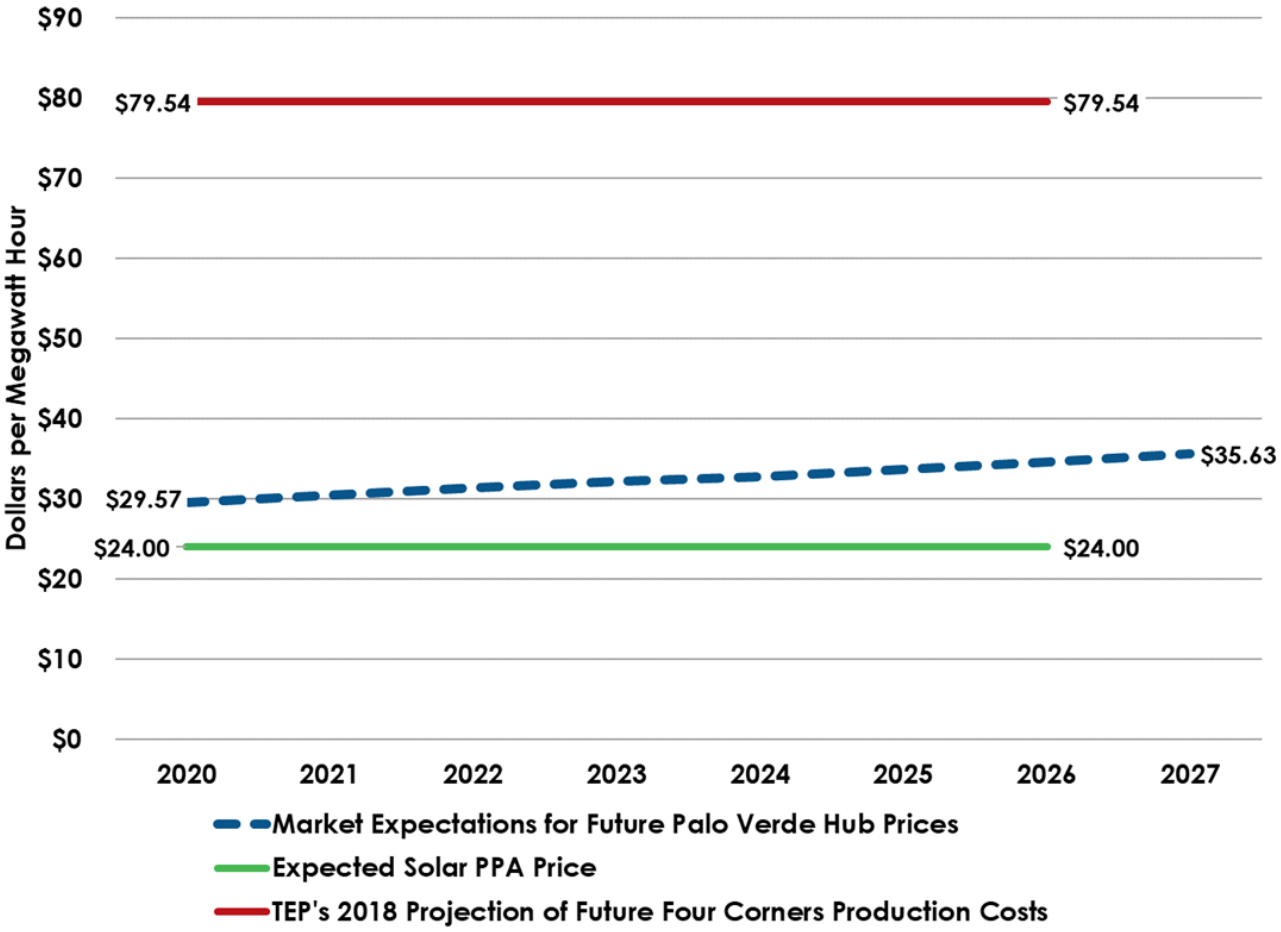


As shown in Figure 6, the average price of producing electricity at Four Corners has exceeded the price of selling power at Palo Verde Hub in every year since 2011, and has greatly exceeded the price of power at Palo Verde in the past three years.

Moreover, the O&M expenses at Four Corners, shown in Figure 6, do not include the hundreds of millions of capital expenditures (capex) that Four Corners' owners have invested in the plant in recent years. These expenditures included the more than $600 million spent on new NO_x control equipment, an imprudent investment in old coal-fired units experiencing sharply declining generation due to increasing market competition from new natural gas-fired and renewable resources.

Barring reversal of the recent growth in production costs shown in Figure 6—and sharp reductions in those costs—the cost of producing power at Four Corners will 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 7, on the following page.

Figure 7: The Gap Between Cost of Producing Power at Four Corners and Palo Verde Hub Energy Market Prices[19]

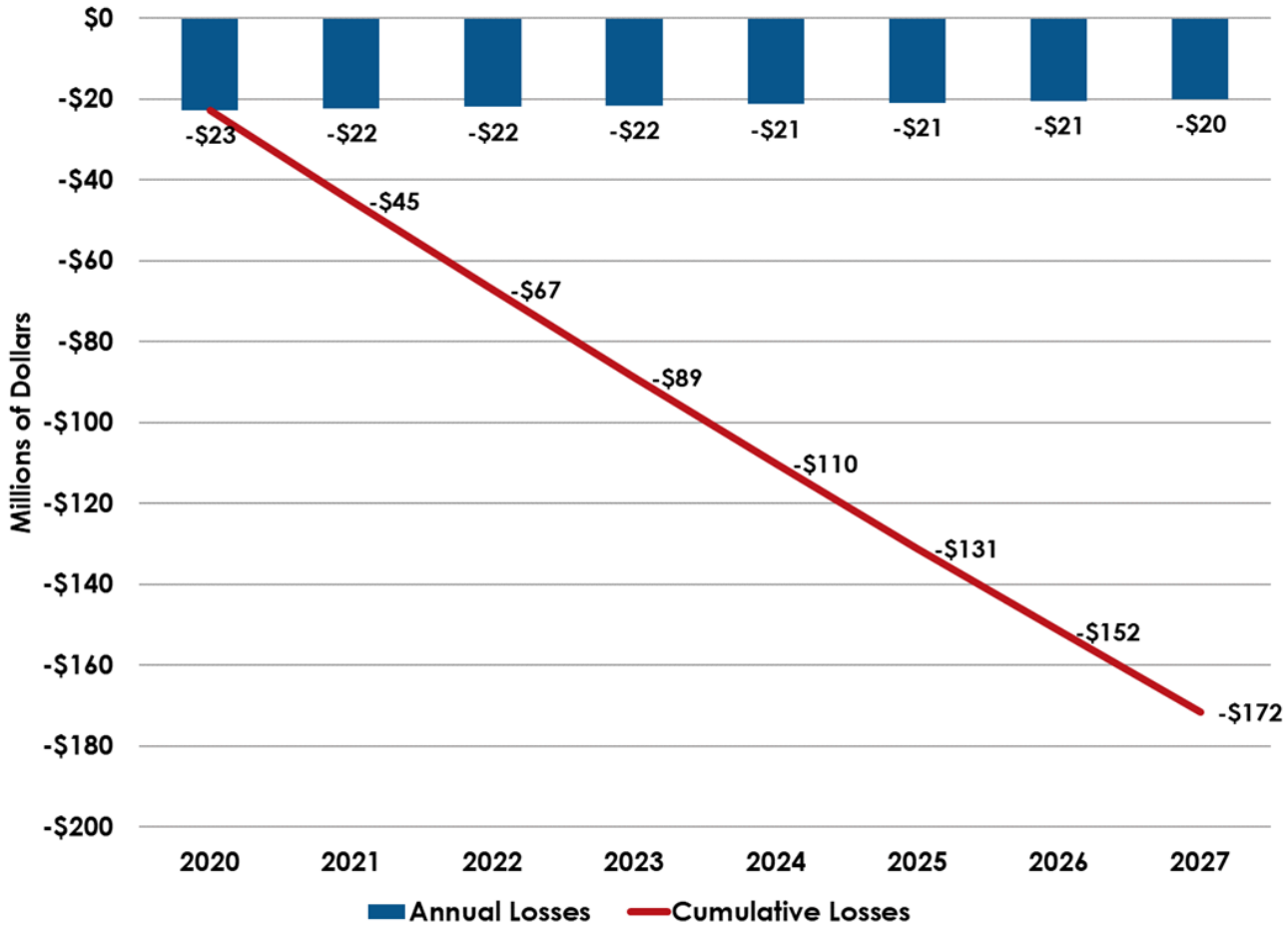


Conclusion

Thus, NTEC can be expected to lose approximately $170 million during the years 2020-2027 due to its investment in Four Corners. And this loss doesn't include the approximately $100 million that we estimate NTEC paid for its 7% share of the plant or any operating losses it will incur from owning Four Corners in 2018 and 2019, or after 2027.

[19] Based on Tucson Electric Power's April 23, 2018 Response to ACC Notice of Inquiry – Review, Modernization and Expansion of the Arizona Renewable Energy Standard and Tariff Rules and Associated Rules, Docket No. E-00000Q-16-0289.

Figure 8: Annual and Cumulative Losses That NTEC Can Be Expected to Incur From Its Ownership of Four Corners Units 4 and 5



This analysis assumes the same Four Corners costs and Palo Verde Hub prices as are shown in Figure 6. It also assumes that Four Corners Units 4 and 5 will generate the same amounts of power in each of the years 2020-2030 that they did in 2017. This is a very conservative assumption as it is more likely that generation at Four Corners will continue to decline substantially as additional renewable resources are added to the grid in California and the Southwest. NTEC's losses would be higher if such additional declines in generation were assumed.

At the same time, customers of Four Corners will be forced to bear more than $2.3 billion in excess costs in the years 2020-2027 over what they would have had to pay if the owners had purchased equivalent amounts of electricity at the Palo Verde Hub instead of producing it at Four Corners. And this only reflects the costs of purchasing equivalent amounts of energy, not any maintenance capex or future environmental upgrades.

Continuing to operate Four Corners is a bad investment for all of the plant's owners including NTEC and a losing bet for their customers. And it should also serve as a costly lesson as to what the Navajo Nation would experience if it decides to acquire NGS.

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Important Information