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Institute for Energy Economics and Financial Analysis
IEEFA.org

Another Expensive Mistake by NTEC

Wasting More of the Navajo Nation's Resources at Four Corners

Executive Summary

In July 2018, the Navajo Transitional Energy Company (NTEC) acquired a 7% ownership share in the coal-fired Four Corners Power Plant (Four Corners) from Arizona Public Service Company (APS). APS had purchased the 7% share from El Paso Electric Company, which dropped out at the end of 2013.

IEEFA evaluated NTEC's 2018 initial acquisition of a piece of Four Corners in a report, *A Bad Bet: Owning the Four Corners Coal Plant is a Risky Gamble*.[1] In that report, IEEFA concluded that NTEC was likely to incur significant financial losses due to its ownership stake in Four Corners because the plant was becoming an increasingly unreliable and expensive source of power, especially when compared to the wholesale cost of buying electricity at the Palo Verde Hub and the declining prices of renewable solar power purchase agreements (PPAs).

It appears NTEC is now seeking to purchase a larger stake in Four Corners, as revealed at a Navajo Nation Council meeting during the week of June 1, in which Public Service Company of New Mexico (PNM) was said to be planning to sell its 13% share to NTEC.

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; PNM owns 13%; Salt River Project (SRP) 10%; Tucson Electric Power (TEP) 7%; and NTEC 7%. If the transaction with PNM proceeds, NTEC would become the second-largest owner with a 20% share.

APS, SRP and TEP were part of the ownership group that closed the Navajo Generating Station (NGS) at the end of 2019 "because of the rapidly changing

[1] IEEFA. DSchlissel. A Bad Bet: Owning the Four Corners Coal Plant is a Risky Gamble for the Navajo Nation and the Plant's Other Owners. December 2018.

economics of the energy industry, which has seen gas prices sink to record lows and become a viable long-term and economic alternative to coal power."[2] These same changing industry economics (including the rapid growth and declining cost of renewables) that led to the closure of NGS also have led PNM, TEP and the other owners of the San Juan Generating Station to decide to close that plant in 2022, and have led PNM to want as early an exit as possible from Four Corners.

IEEFA has analysed the financials again, and our updated analysis of financial and plant operating data shows clearly that Four Corners is not—and never will be—a profitable investment for anyone. IEEFA estimates that NTEC is likely to incur losses of at least $350 million to $400 million between 2021 and 2031 if it acquires PNM's share. These losses do not include any purchase price that NTEC would have to pay or any additional environmental clean-up costs (at either the plant or at its fuel-source Navajo Mine) it would have to assume.

Financial and plant operating data clearly shows that Four Corners is not—and never will be—a profitable investment for anyone.

The Navajo Nation Council has made it clear that it does not want to be further burdened financially by NTEC actions to bail out coal facilities. In March 2019, the Council announced it would not provide any financial guarantees pertaining to NTEC's proposed acquisition of Navajo Generating Station and Kayenta Mine in Arizona.[3] The Navajo Council subsequently denied NTEC's ability to use Nation assets as collateral for its reclamation bonds in its ill-advised purchase of coal mines in Montana and Wyoming from bankrupt Cloud Peak Energy.[4]

If NTEC were to buy the PNM stake in Four Corners, it would be doing so in the face of six potentially crippling risks: The advanced age of the plant; the long term decline in electricity production at the plant; competition from low gas prices; growing competition from lower-cost renewable energy; the high cost of producing power at Four Corners; and exposure to liabilities from water pollution and coal ash.

[2] *SRP Press Release, Owners Vote on Navajo Coal Plant Lease.* February 13, 2017.
[3] 24th Navajo Nation Council Resolution 0044-19, March 2019.
[4] 24th Navajo Nation Council Resolution 0325-19, October 2019.

Table of Contents

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 currently 50 and 51 years old, making them among the oldest large coal-fired generating plants (400MW or larger) still in service in the U.S. If the units run until 2031, as the plant owners now plan, they will be 61 and 62 years old when they're retired.

It is worth noting that 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 significant number of other units are scheduled for retirement over the next four to five years. For example, of the 42 coal-fired units of that were 500MW or larger and that were retired by the end of 2019, only two were older than 54 when they were closed—and none had reached 62 years old, the age Four Corners Unit 4 would be if it operates until 2031. The median age of retirement for the 42 units was 44; the weighted average retirement age was 42.[5]

At the same time, 215 coal-fired units of 500MW in size or larger remain in operation. Yet only 15, or just 7%, are older than Four Corners Unit 4. The median age of these units is 42; the weighted average age is 39.[6]

Older plants tend to cost more to operate and maintain, and are less reliable.

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

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; that is, the plant burns more fuel to produce the same output of electricity, which in turn raises plant fuel and operating costs.

Older plants also tend to cost more to maintain, as equipment and components degrade or fail and must be repaired or replaced.

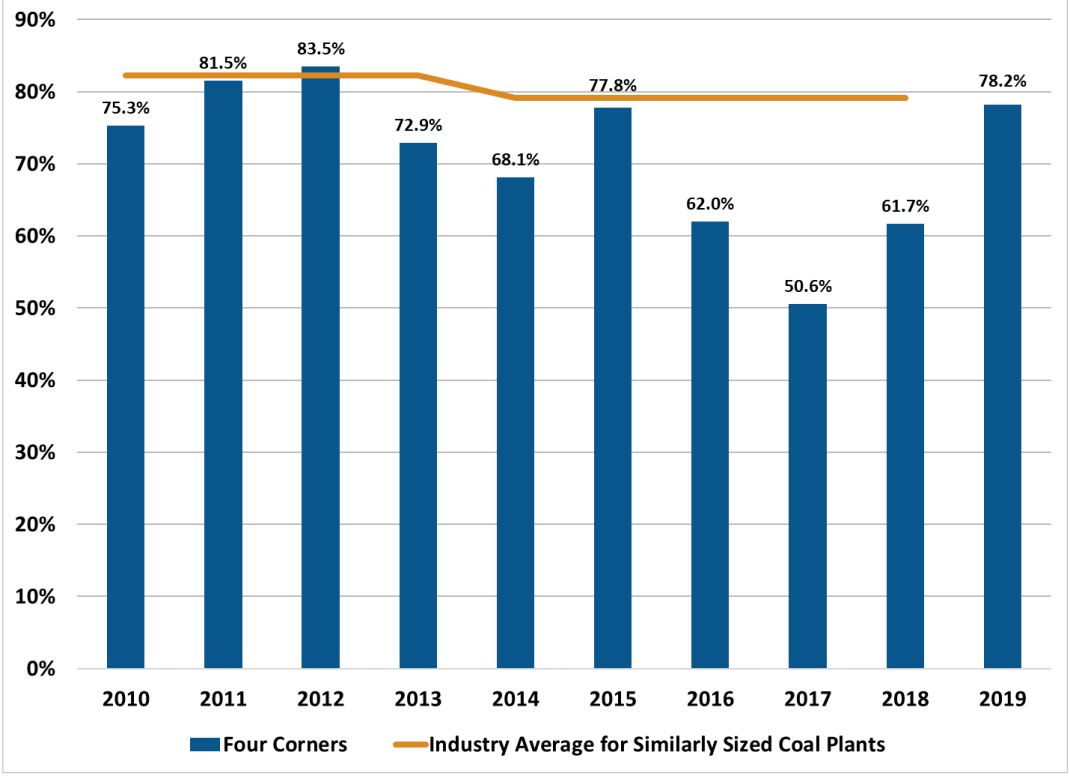
Further, older coal plants tend to experience more unanticipated problems and are shut down more frequently for unplanned outages. A plant's equivalent availability factor (EAF) measures how much of the time a plant operates and takes into account planned and unplanned reductions in power output, providing a meaningful method of tracking plant operations and comparing similar facilities.

As shown in Figure 1, Four Corners' annual EAF declined substantially between 2008 and 2018, before jumping up in 2019, meaning that the units have been

[5] Coal plant age data downloaded from S&P Global Market Intelligence on July 1, 2020.
[6] *Ibid*.
[7] For example, see: U.S. Department of Energy. *Staff Report to the Secretary on Electricity Markets and Reliability*. August 2017, p. 155.

available to operate at full power less and less over time. Figure 1 also shows that the EAF at Four Corners has been significantly worse than the average for similarly sized coal units. In fact, Four Corners' average EAF of 66% for the years 2015-2019 was substantially below the approximate 80% EAF achieved by other comparably sized coal units in the U.S.

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



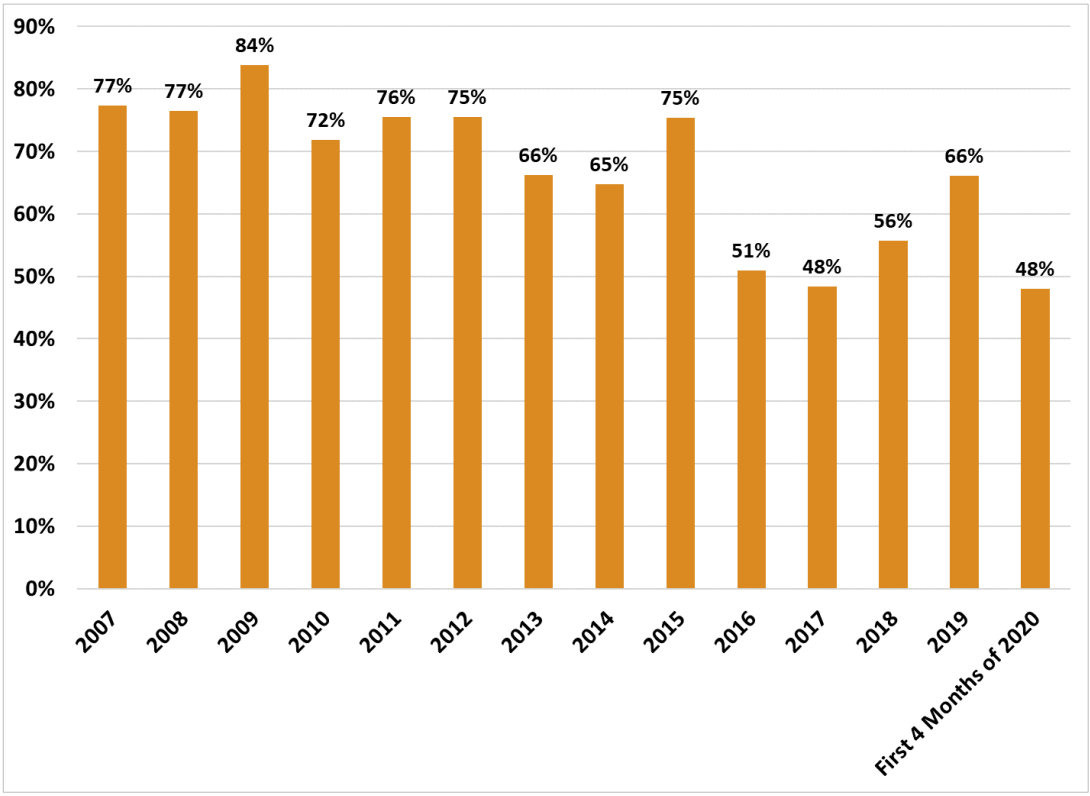
Source: Public Service Company of New Mexico FERC Form 1 filings for the years 2009-2019.

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 has declined over the past decade, as reflected in the drop in the units' average capacity factors. A plant's capacity factor compares how much electricity it actually generated in a period (say a month or a year) with how much it would have generated if it had operated at full power for all of the hours in the period. A higher capacity factor is better, as it means the plant produced more electricity. Conversely, a lower capacity is worse.

[8] 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 Capacity Factors 2007-April 2020



Source: EIA Form 923 filings.

The average 59% capacity factor for Units 4 and 5 in the years 2015-2019 was 11 percentage points lower than their 71% average capacity factor in the preceding five-year period, 2010-2014.

This steep drop in generation at Four Corners has been 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 as the cost of producing power at Four Corners continues to rise.

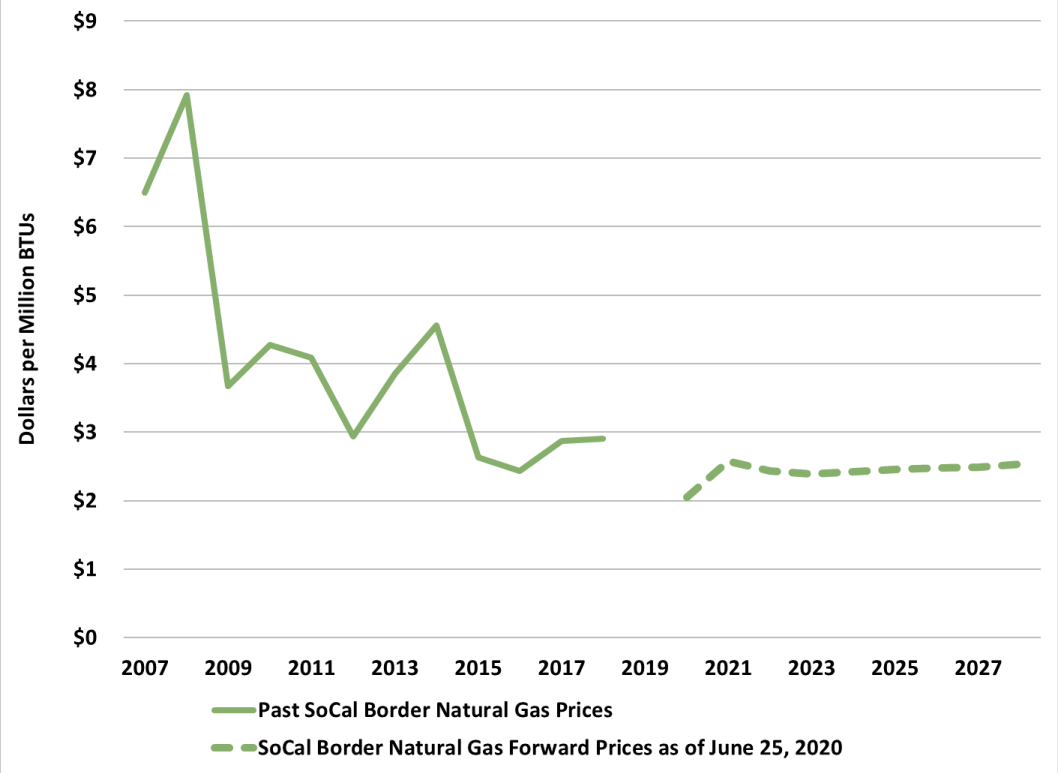
The drop in generation at Four Corners has been due to increased competition from natural gas and renewable resources.

The amount of power generated at Four Corners has continued to decline in 2020, as the two units achieved only a 48% capacity factor during the first four months of this year, generating 20% less electricity than they did over the same period in 2019.

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

Similar to what has happened throughout the U.S., 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 trend has undermined and will continue to undermine the profitability of Four Corners by reducing fuel costs for competing gas plants and by keeping energy market prices low.

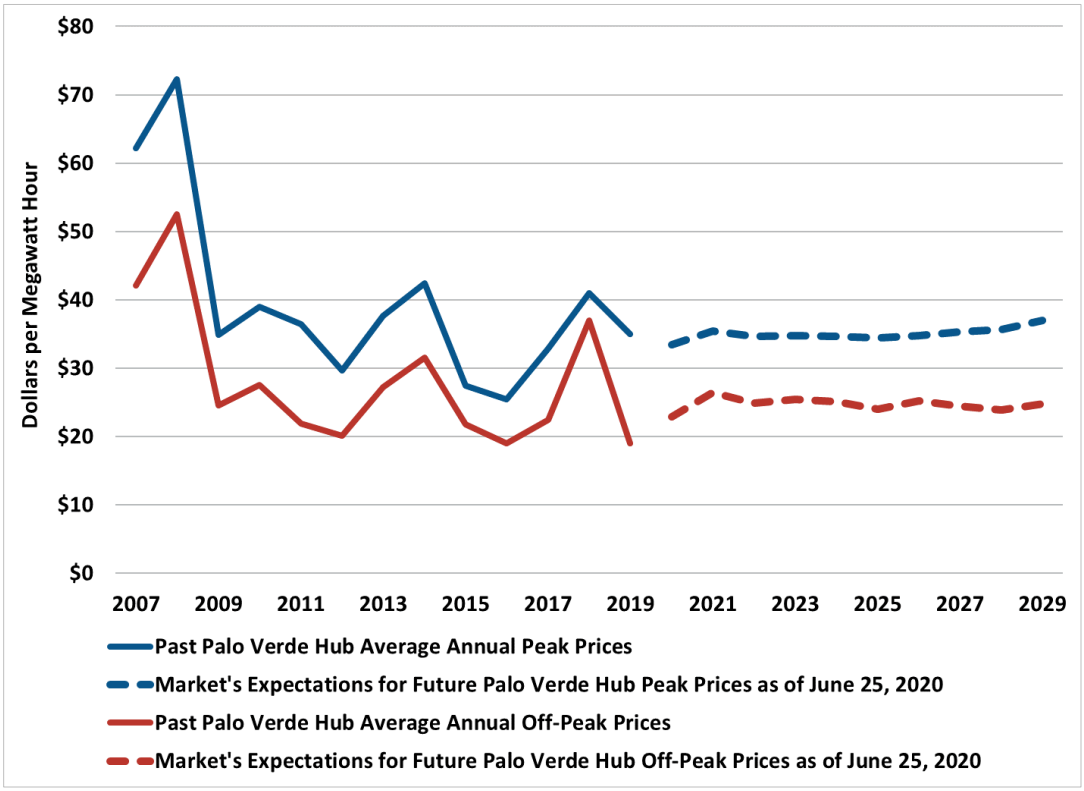
Figure 3: Gas Prices at SoCal Border Hub, 2007-2029



Source: S&P Global Market Intelligence.

Because low gas prices reduce the costs of running gas-fired plants, they adversely affect 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 gas prices have meant that energy market prices also have been low, and can be expected to remain that way for the foreseeable future.

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



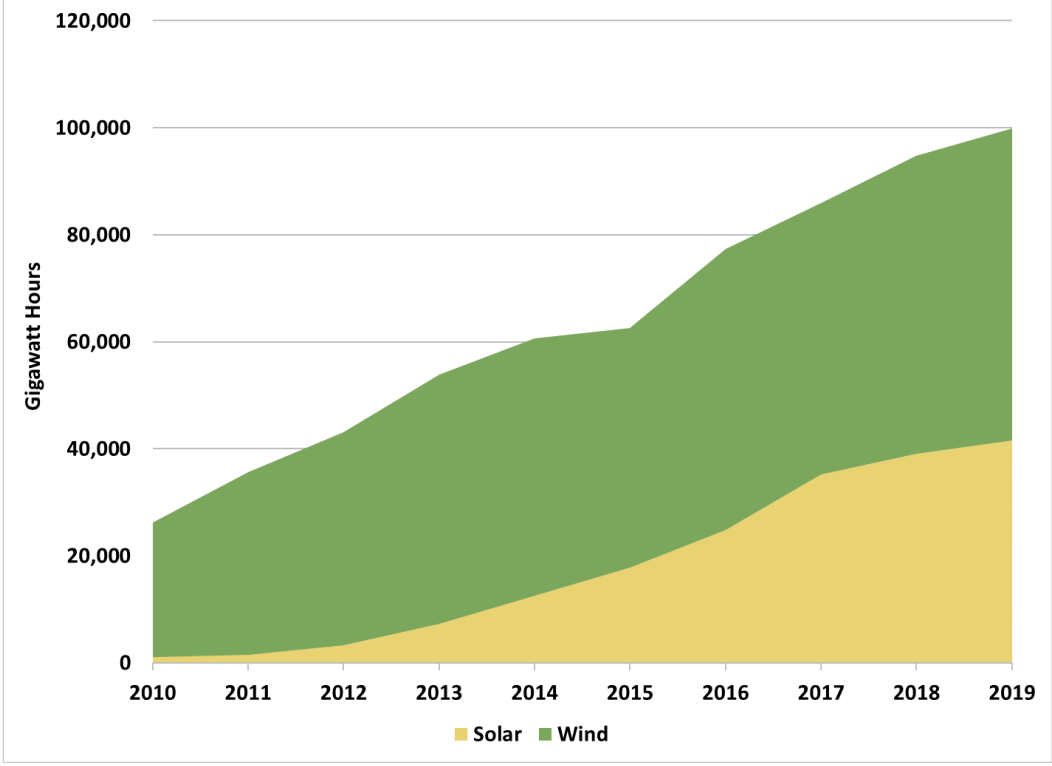
Sources: S&P Global Market Intelligence

Consequently, not only have coal plants in the Southwest like Four Corners been generating fewer megawatt-hours (MWh), their owners 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

Wind and solar generation have increased significantly in the Western U.S. over the past decade, with dramatic price declines resulting in a four-fold increase in generation between 2010 and 2019.

Figure 5: Increasing Generation in the Western U.S. from Wind and Solar Resources



Source: EIA Electric Power Monthly.

Much more renewable generation is on the horizon regionally as states push utilities to boost their renewable generation and as energy markets favor the economic competitiveness of wind and solar. California, for example, now mandates that 33% of electricity sales in 2020 and 60% of sales in 2030 come from renewable resources.[9] Colorado is pushing a roadmap to 100% renewable energy in the state by 2040, and Nevada passed legislation last year requiring the state's utilities to meet a 50% renewable energy standard by 2030.

More renewable generation is on the horizon, as states push utilities to boost renewables and as energy markets favor wind and solar economics.

New Mexico last year enacted a law that requires utilities to get 50% of their power from renewables by 2030 and 80% by 2040, and hearing examiners for the New Mexico Public Regulation Commission have recommended that PNM replace its share of the San Juan Generation Station with 650 MW of solar resources and 300

[9] State of California. Renewables Portfolio Standards Program. Stats. 2018, Ch. 312, Sec. 2. (SB 100) (effective January 1, 2019); Cal. Pub. Util. Code § 399.11.

MW of battery storage.[10] Similarly, last spring, NV Energy announced plans to add 1,000MW of new solar resources plus 100MW of battery storage, all by 2021.[11]

Even in states with less aggressive policy mandates, such as Arizona, market pressure and concern over costs are forcing utilities to transition away from fossil fuel generation resources. For example, SRP has announced plans to add 1,000MW of new solar resources by 2025.[12]

APS recently issued its 2020 integrated resource plan (IRP), which calls for adding 2,894 MW of capacity by the end of 2024—575 MW of demand-side management; 193MW of demand response; 408MW of distributed energy resources; 962MW of renewable resources; and 750MW of energy storage.[13] Similarly, TEP's 2020 IRP adds 2,457MW of new wind and solar resources, including 457MW coming online by 2021.[14]

As the amount of renewable generation has climbed, prices for renewables have fallen significantly.

As the amount of installed renewable generation has climbed, the prices of buying power from solar and wind resources have fallen significantly.

Data from Lawrence Berkeley National Laboratory (LBNL) shows that the prices of solar power purchase agreements (PPAs) have fallen dramatically in all regions of the country, declining by more than 80%.[15] Current PPA prices are now commonly below $50/MWh and often significantly less. In a review of 38 PPAs signed since 2017, LBNL found that 27 were priced below $40/MWh, with 21 less than $30/MWh and four under $20/MWh (all in 2018 dollars).[16] Significantly, the LBNL survey also found that 23 of these PPAs included battery storage of four to five hours and that these projects were not much more expensive than the PPAs from the solar-only projects.[17] And solar PPA prices are expected to continue to decline over time.

In a sign of things to come, the Central Arizona Project (CAP) signed a 20-year PPA in 2018 for solar energy at a price of $24.99 per MWh.[18] Shortly after CAP

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[10] PRC Docket No. 19-00195-UT Recommended Decision on Replacement Resources Part 2, dated June 24, 2020, at pages 124 and 164.
[11] Greentech Media. NV Energy Contracts to Build More Than 1,000MW of New Solar, 100MW of Battery Storage. May 31, 2018.
[12] *SRP Plans 1,000 Megawatts of New Solar Energy by 2025.* November 15, 2018.
[13] Arizona Public Service Company *2020 Integrated Resource Plan*, at page 135 of 553.
[14] Tucson Electric Power Company *2020 Integrated Resource Plan*.
[15] Lawrence Berkeley National Laboratory (LBNL). Utility-Scale Solar 2019 Edition. December 2019. Prices cited here are levelized in 2018 U.S. dollars and include any contract escalation clauses.
[16] *Ibid.*
[17] *Ibid.*
[18] Greentech Media. Arizona Water Provider Approves Record-Low-Cost Solar PPA to Replace Coal. June 8, 2018.

announced the PPA, NV Energy said it had agreed to a 300MW solar PPA at $23.76/MWh for 25 years, a price that was believed to have set a new record.[19] NV Energy subsequently signed a PPA for power from a project that includes 300MW of solar and 135MW of four-hour storage with a price that averages about $35/MWh.[20]

Two new PPAs signed by El Paso Electric were for much lower prices than even the NV Energy PPA. One will provide 100MW of solar resources for $15/MWh. The other will provide 100MW of solar resources and 50MW of storage for $30/MWh. Both projects are in New Mexico.[21]

A similar trend is evident in the wind industry. Prices for the best wind resources in the Interior region of the U.S. were roughly $60/MWh in 2009-2010; today, PPAs in those same areas are often in the $15-$20/MWh range. Wind prices in the rest of the country have fallen sharply as well, dropping from an average of around $90/MWh in 2010 to less than $30/MWh today.[22]

These PPA price declines have been the result of dramatic declines in the cost of installing both solar and wind projects, and the falling cost of storage.

For example, the average installed cost of wind projects has dropped 33% from a peak in 2009-10.[23] The median installed price for utility-scale solar projects has fallen by two-thirds over the past decade or so.[24] The installed prices for small-scale distributed solar projects have also fallen.[25]

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.

The risk to Four Corners from lower-cost solar, wind and storage 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. All of Four Corners' current owners except for NTEC either are members of the EIM, as are PacifiCorp and several other utilities in the West, or are planning to join in the next year or two.

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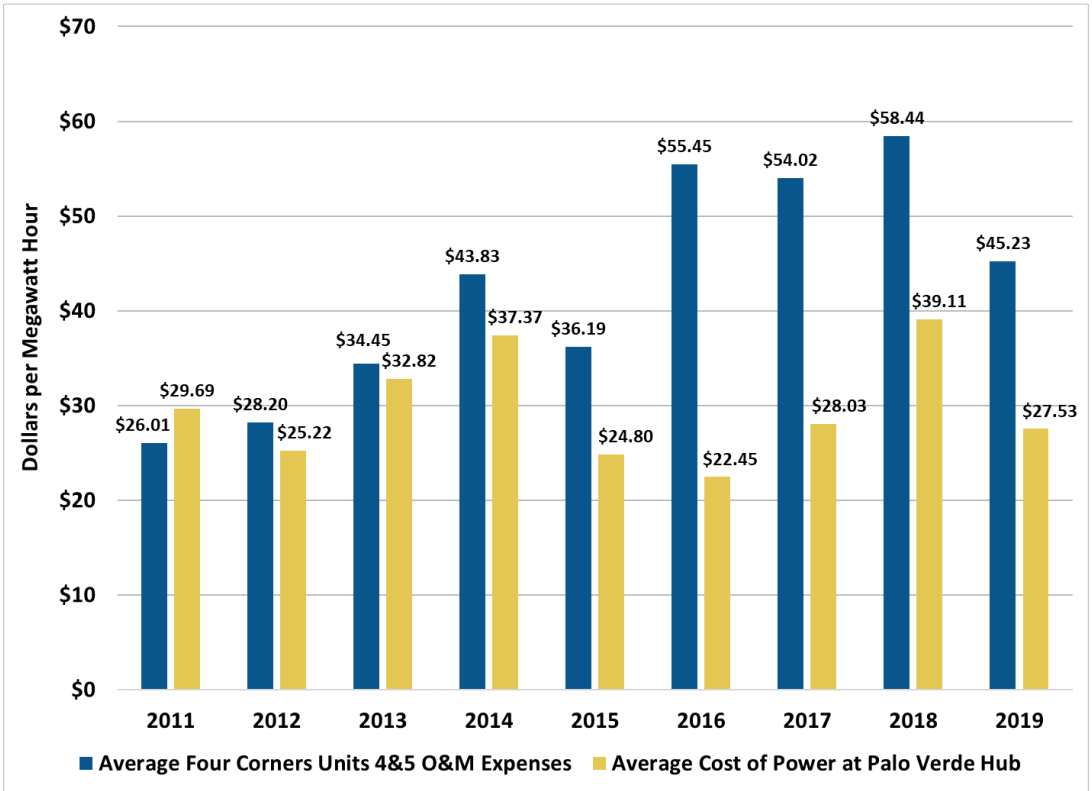
[19] Utility Dive. NV Energy 2.3 cent solar contract could set new price record. June 13, 2018.
[20] Greentech Media. NV Energy Announces 'Hulkingly Big' Solar Plus Storage Procurement. June 25, 2019.
[21] El Paso Electric. Application for Approval of Long-term Purchased Power Agreements with Hecate Energy, Buena Vista Energy and Canutillo Energy Center. November 18, 2019.
[22] U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy. 2018 Wind Technologies Market Report. August 9, 2019.
[23] U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy. 2016 Wind Technologies Market Report. August 2017.
[24] Lawrence Berkeley National Laboratory. Utility-Scale Solar 2016. September 2017.
[25] Lawrence Berkeley National Laboratory. Tracking the Sun. October 2019..

The EIM enables member utilities access to trade low-cost renewable generation across a broad geographic footprint, pushing the market cost of power down for everyone. In addition, by giving utilities access to more renewable generation, it will inevitably reduce the market share for higher-cost, more polluting resources such as Four Corners. Another problem for Four Corners (and for other coal plants) is that California (the West's largest electricity market by far) requires a greenhouse adder to be tacked onto power offered for sale into the state, further undercutting potential coal-based sales.

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 between 2011 and 2019. Part of this increase was due to the plant's decline in generation, shown in Figure 2, as its fixed operating costs were spread over fewer megawatt-hours of output.

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



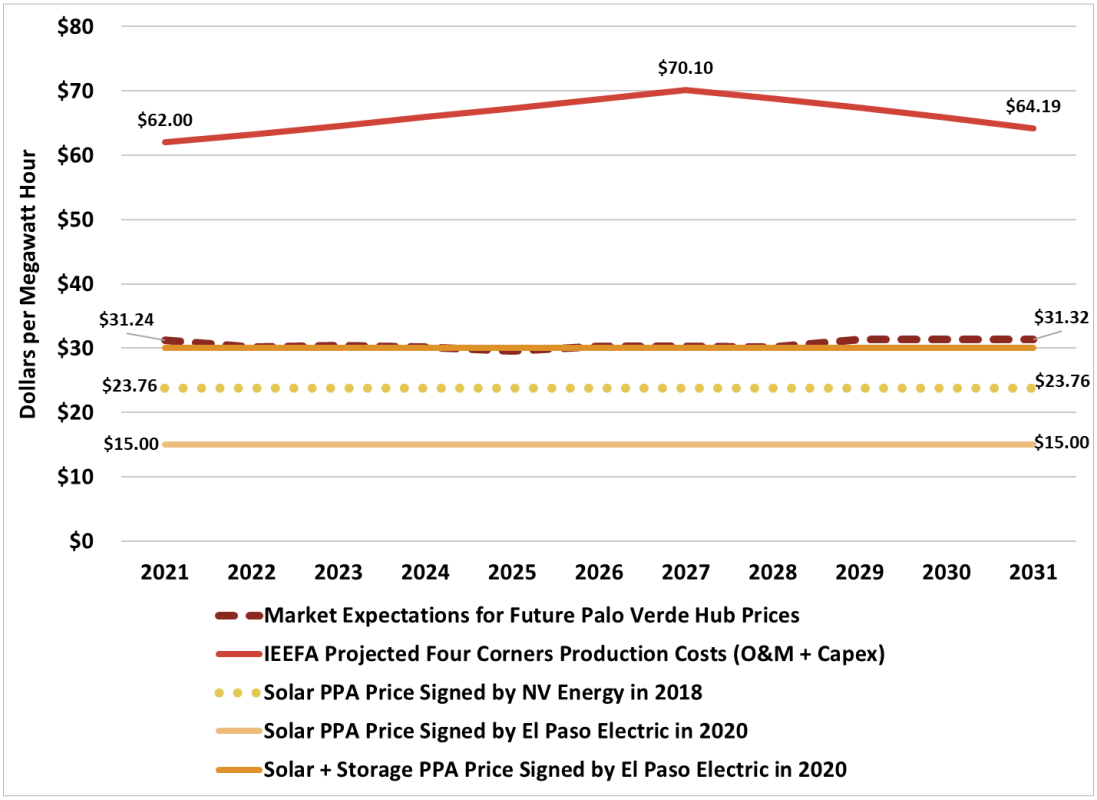
Source: Four Corners O&M from APS FERC Form 1 Filings and Palo Verde Hub Prices from S&P Global Market Intelligence.

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 six years.

Barring sharp reductions in Four Corners' costs, the cost of producing power at Four Corners will continue to be much higher than the prices of new solar power purchase agreements and the market prices at which that power could be sold at the Palo Verde hub, as shown in Figure 7. This dynamic will only become more pronounced as the plant ages and maintenance and repair costs increase, as described above.

The cost of producing power at Four Corners will continue to be higher than that of new solar agreements and market prices.

Figure 7: The Large Gap Between the Cost of Producing Power at Four Corners and Palo Verde Hub Energy Market Prices and Recent Solar PPAs



Sources: IEEFA analysis, Forward Energy Market Prices from S&P Global Market Intelligence, and PPA prices from press releases from NV Energy and El Paso Electric Company

Risk No. 6: Increased Exposure to Water Pollution and Coal Ash Liabilities

On top of increasing operational, maintenance and repair costs, Four Corners owners also face significant potential liability regarding water pollution and coal ash issues.

With regard to water pollution, a coalition of conservation organizations has appealed EPA's issuance of a new water pollution permit for the plant. These permits are supposed to be reissued every five years, but EPA has not issued a new final and effective permit for Four Corners since 2001. The conservation groups had to sue EPA to force issuance of the new permit. They argue that the new permit is legally inadequate because it fails to regulate all water pollution discharges at the plant, fails to set proper pollution limits, fails to regulate discharges into Morgan Lake, and fails to protect endangered species in the San Juan River from the plant's cooling-water intake structure. If the conservation coalition succeeds on any of these claims, expensive plant upgrades could be required.

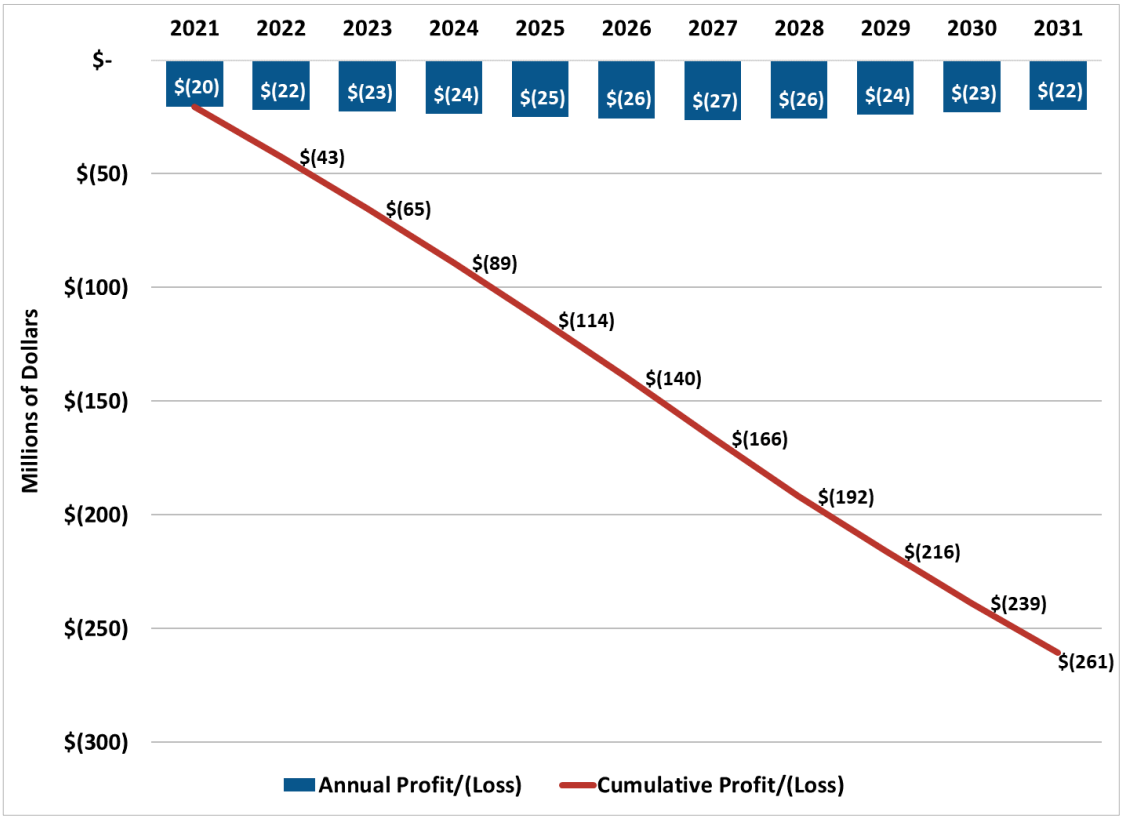
In addition, the federal Environmental Impact Statement for the plant acknowledges that its coal ash surface impoundment is leaking into adjacent watersheds. As a result, the owners have installed a seepage collection and pump-back system. New seeps are occurring forcing the owners to continually expand the seepage collection system. Unless new remedial action is undertaken, the seepage collection system will need to be operated in perpetuity. The new water pollution permit requires more significant monitoring and regulation of the coal ash seeps. The conservation coalition is seeking regulation of all seeps under the appealed water pollution permit, which could require water treatment of the seeps.

Increasing its ownership stake in the plant would, by default, raise NTEC's potential long-term environmental cleanup liabilities. It also would add significantly to the degree of uncertainty regarding future costs since those cannot be calculated with precision while the plant continues to operate.

Conclusion

NTEC can be expected to suffer approximately $261 million in production cost losses during the years 2021-2031 if it acquires PNM's 13% share of Four Corners. This estimate does not include losses that NTEC can be expected to suffer from its current ownership stake of 7%. Nor does it include any price NTEC may have to pay to purchase PNM's share or of any potential environmental liabilities or clean-up costs for Four Corners or Navajo Mine, which is the NTEC-owned source of Four Corners' coal.

Figure 8: Annual and Cumulative Production Cost Losses That NTEC Can Be Expected to Incur From Acquiring PNM's 13% Share of Four Corners Units 4 and 5



Source: IEEFA analysis.

If the production cost losses that NTEC can be expected to experience in the years from 2021-2031 due to its current ownership of 7% of Four Corners are included—from its 20% stake in the plant—the company's total production cost losses from owning the plant in the years 2021-2031 would exceed $400 million.

The analysis shown in Figure 8 uses the same Four Corners costs and Palo Verde Hub prices as are shown in Figure 7. It also assumes that Four Corners Units 4 and 5 will maintain an average 59% capacity factor from 2021-2031, the same average the units posted from 2015-2019. This is a very optimistic assumption as it is more likely that generation at Four Corners will decline in coming years as the units age and additional renewable resources are added to the grid in California and the Southwest.

NTEC's production losses from Four Corners will be higher in future years even if Four Corners operates better than IEEFA now expects (say an average 66% capacity factor instead of the 59% capacity factor it averaged in 2015-2019) and has lower production costs, NTEC's production cost losses from owning 20% of the plant will still be roughly $350 million.

Overall, Four Corners' owners and their customers can expect to pay between $1.75 billion and just over $2 billion more for electricity from Four Corners in the years 2021 to 2031 compared to what they would pay if the owners purchased equivalent amounts of electricity at the Palo Verde Hub instead. And the actual excess cost of power from Four Corners could be higher if the plant's capacity factor is lower than 59% and/or its production costs are higher than IEEFA has assumed.

Continuing to operate Four Corners would be bad for all the plant's owners and a losing bet for their customers.

Continuing to operate Four Corners would be a bad investment for all the plant's owners, including NTEC, and a losing bet for their customers. Buying even more of the plant would be a massive mistake by NTEC and, by extension, the Navajo Nation. A much more cost-effective and forward-thinking option would be to push for Four Corners' closure and plan for new plant-sited solar and battery storage to replace costly coal power and take full advantage of existing transmission infrastructure.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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David Schlissel, director of resource planning analysis for IEEFA, has been a regulatory attorney and a consultant on electric utility rate and resource planning issues since 1974. He has testified as an expert witness before regulatory commissions in more than 35 states and before the U.S. Federal Energy Regulatory Commission and Nuclear Regulatory Commission. He also has testified as an expert witness in state and federal court proceedings concerning electric utilities. His clients have included state regulatory commissions in Arkansas, Kansas, Arizona, New Mexico and California. He has also consulted for publicly owned utilities, state governments and attorneys general, state consumer advocates, city governments, and national and local environmental organizations.

Schlissel has undergraduate and graduate engineering degrees from the Massachusetts Institute of Technology and Stanford University. He has a Juris Doctor degree from Stanford University School of Law.