Vincent Yazzie
5/18/17

Resolution of the Navajo Nation Council; For the Transition of the Navajo Generating Station and Peabody Coal Mines with Renewable Navajo-owned Energy – Navajo Renewable Energy

Whereas:

- The Navajo Generating Station (NGS) is owned by: 24.3% - Bureau of Reclamations (BOR); 42.9% - Salt River Project (SRP); 14.0%- Arizona Public Service Co. (APS); 11.3% - Nevada Energy (NE); 7.5% - Tucson Electric Power (TEP)
- Salt River Project (SRP is the operator of the NGS
- 2250 MW Capacity – 3 units 750 MW each
- In 1968 the Navajo Nation passed a resolution waiving 50,000 acre/feet (a/f) of water on the Upper Colorado River Basin for NGS for a period of 50 years or for the life of NGS, whichever comes first. The Nation receives no direct revenue from relinquishment of these rights
- In 1969 the U.S. Department of Interior (DOI) leased 34,100 a/f of water per year from Lake Powell to the Salt River Project Agricultural Improvement and Power District (SRP) for the Navajo Generating Station (NGS). Water for NGS is allocated from the State of Arizona's 50,000 a/f apportionment of Upper Colorado River Basin water. The lease agreement was contingent upon the Navajo Nation's non-assertion of tribal water right claims to Arizona's Upper Colorado River Basin apportionment.
- In 1969 DOI and NGS operators entered into a 50 year Right-of-way (ROW) and easement agreement with Navajo Nation. The Tribe was provided a one-time payment of $925.00. The operators were required to carry property damage insurance of not less than $1 million dollars.
- In 1969 DOI and NGS operators entered into a 50-year site-lease agreement with the Navajo Nation. Among other things, the agreement authorizes operators of NGS to dispose of and dump coal ash waste from NGS on tribal lands. The Tribe was provided an annual rental fee of $160,000 dollars per year for 25 years (4million dollars over 25 years).
- In 1969 construction began on NGS.
- In 1974 the first Unit of NGS was operational. Units two and three followed in 1975 and 1976 respectively. At full operation, the plant has a 2,250-MW capacity and burns up to 25,000 tons of coal per day.
- NGS was partially funded by US Congress to assist in the development of Central Arizona Project (CAP) – a water delivery project for central and southern Arizona.
- BOR owns 100% of CAP. CAP is operated and managed by Central Arizona Water Conservation district (CAWCD).
- Peabody Energy operates the Kayenta Mine which supplies coal to NGS.
- The original lease was signed in 1964 between the Navajo Nation and Sentry Royalty Company. The lease was amended in 1987 and Peabody Coal Company was assigned all of Sentry's rights under the lease.
- Peabody's lease is good "for so long" as "coal and kindred products, including other minerals, except oil and gas" "are being mined" by Peabody.
- Peabody has used on average 4150 a/f per year from 1972 to 2003. This is equivalent

to 11.3 a/f per day. 1 a/f equals 325,850 gallons. This is 3.5 million gallons a day for 31 years.

- Under the lease, the Navajo Nation receives "12.5% of the monthly gross realization for all coal from the premises leased."

- Peabody's Black Mesa Mining Operation is approximately 18,984 acres. The Black Mesa mine was closed in December 2005 after closure of the Mojave Generating Station.

- The Los Angeles Department of Water and Power announced in the spring of 2009 that it would not renew its contract to purchase coal fired electricity from NGS once the current contract expires in 2019.
- The Los Angeles Department of Water and Power announced in the summer of 2016 the sale of its share of NGS.
- Nevada Energy has expressed interest in selling its share of NGS.
- DOI's lease with SRP for water for NGS expires on December 31, 2016.
- DOI and NGS operators' ROW and easement agreement expires in 2019.
- DOI and NGS operators' site lease agreement expires in 2019.
- Renewal of the water, ROW and site lease agreements will require compliance with, among other things, the National Environmental Policy Act and development of an Environmental Impact Statement (EIS).
- The U.S. Environmental Protection Agency decision to adopt the Technical Working group proposal and extend the time frame for an NGS cleanup was challenged by local NGOs. This decision was released March 20, 2017 in favor of EPA.
- NGS ranked number four in the nation in 2006 for NOx emissions with 34,744 tons per year (tpy).
- The Federal Office of Surface Mining's renewal permit for Peabody's Kayenta Mine is currently subject to legal challenge based on, among other things, Peabody's alleged material damage to ground water and specifically the Navajo Aquifer from 40 years of pumping.
- SRP, the operator of NGS, announced in February 2016, that it would close the NGS plant at the end of 2016 and decommission it by the end of 2019.
- In February, the remaining owners of the NGS, voted to end operation and decommission by the end of 2019
- In order to maintain revenues and employment for the Navajo Nation, the Nation must secure the transmission lines, the land, and water rights, purchaser, and finance the construction of Navajo-owned Renewable Energy
- It is prudent for the Navajo Nation to investigate alternatives and supplements to NGS in order to maintain revenues and employment for the Navajo Nation
- There is an abundant solar resource available around the NGS.
- Electric and governmental utilities in the Southwest (including Arizona and California) are very interested in renewable electricity generation. Many have Renewable Portfolio Requirements and they have purchased, and continue to purchase, significant quantities of renewable generation
- The reduction in NGS generation frees up transmission lines that could be used to

transport solar generation into the western grid.

- The development of a solar generation resource around NGS would provide employment for Navajo workers and additional revenue for the Navajo Nation from the sale of renewable electricity.

Now Therefore it be Resolved:

The Navajo Nation will investigate the practicality and feasibility of a Navajo Renewable Energy project located around NGS to supplement and eventually replace the Navajo Generating Station with Renewable Navajo-owned Energy

The Navajo Nation will provide full support to the effort necessary to secure permits, clearances necessary to develop and construct on identified sites. This includes but is not limited to: NTUA, Navajo Nation Land Department, Navajo Nation Division of Natural Resources, Navajo Nation EPA, Navajo Nation DOJ, Navajo Nation Fish and Wildlife, Navajo Nation Historic Preservation, Navajo Nation Water Department, and others to initiate and complete environmental and regulatory review and secure permits necessary

The Navajo Nation will investigate the development of a training program to train Navajo solar workers to install and maintain Navajo Renewable Energy

The Navajo Nation will investigate development of Navajo Renewable Energy project in stages, with construction of portions of the project dependent upon contracts for the sale of renewable electricity.

The Navajo Nation will support efforts to sell portions of the Navajo Renewable Energy project output to interested parties. These can include governmental entities (Bureau of Reclamation and the Central Arizona Project in Arizona and the Department of Water Resources in California) and electric utilities in California, Arizona, Nevada, and other adjacent states.

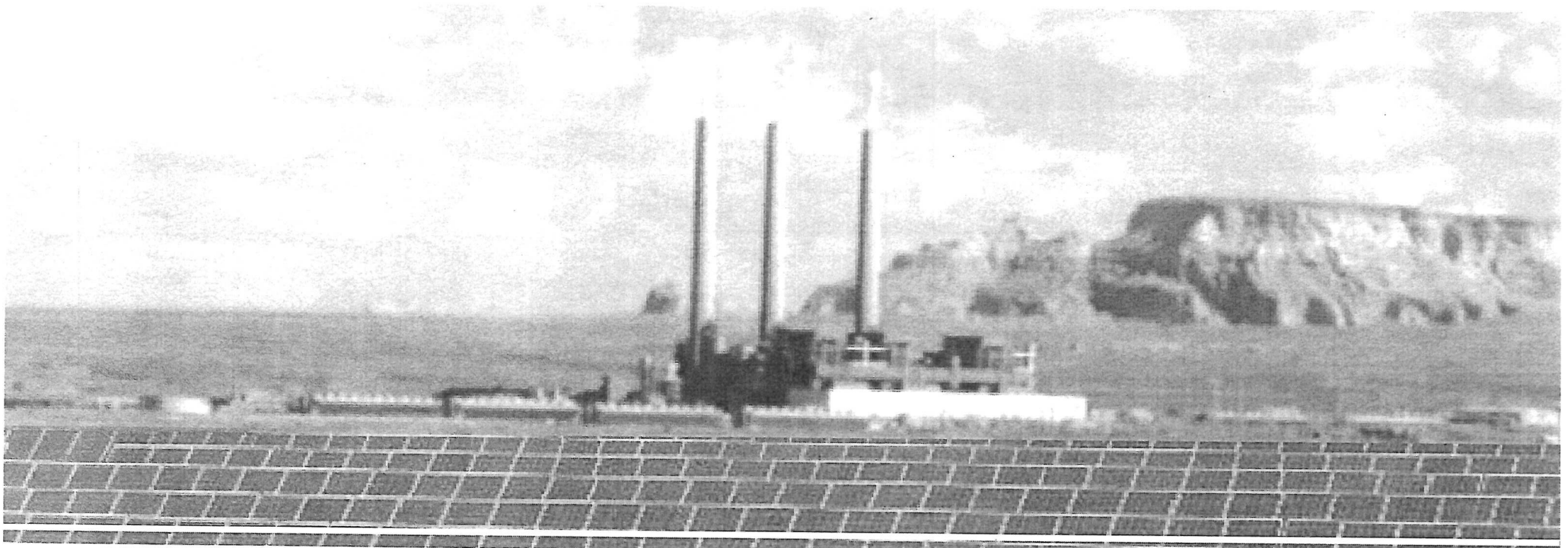
The Navajo Nation will develop a training program to train workers to install and maintain Navajo Renewable Energy

The Navajo Nation will cooperate with local chapters in approving land withdrawals for specific projects and for developing community benefits and agreements, including ownership options for community equity in the project.

The Navajo Nation, in cooperation with the Department of the Interior, will explore opportunities for reusing the NGS siphon/pump, located in Lake Powell, as part of a new water delivery and distribution system to benefit Native communities in the region, and with options for Native-owned renewable energy projects to supply electricity to run the water system.

The Navajo Nation will cooperate with the U.S Bureau of Reclamation and the Hopi Tribe in seeking mutually beneficial renewable energy projects, including but not limited to joint ventures where both the Navajo Nation, and Bureau of Reclamation may share costs and

revenues proportional to the percentage of equity owned by each participant

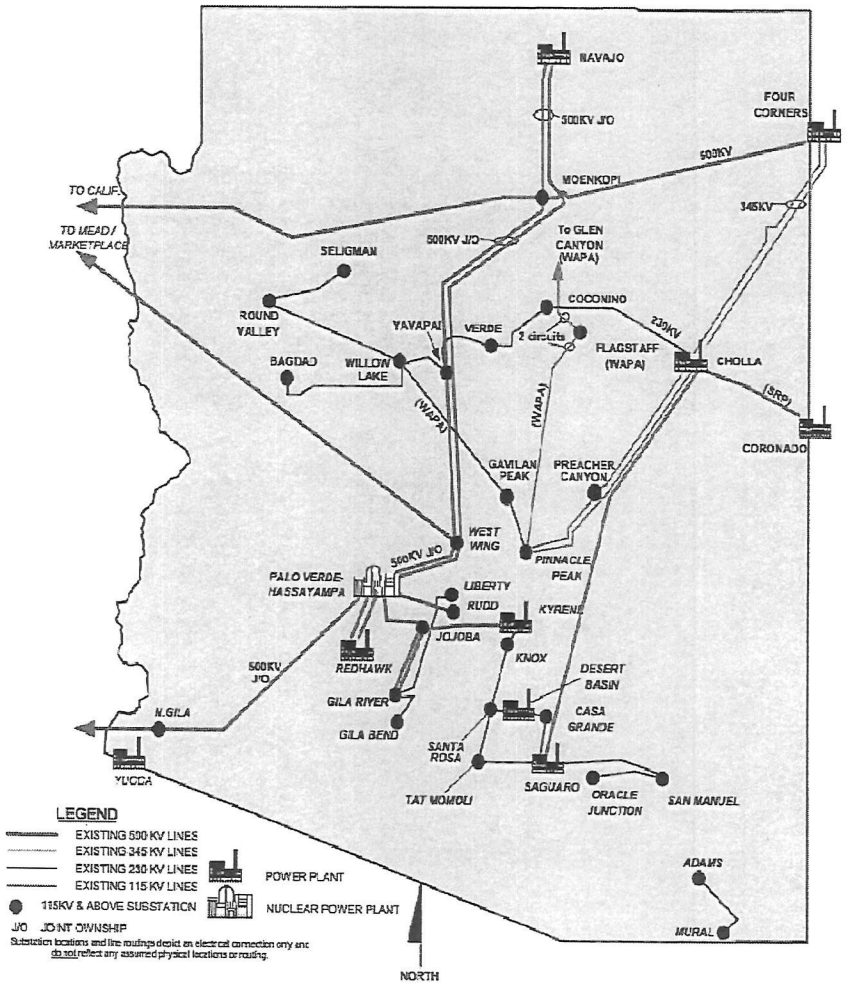


Program To Supplement (and Eventually Replace) Navajo Generating Station with Renewable Navajo-owned Energy

Proposal Overview

- Transmission
  - Use existing NGS transmission access to transport solar generated electricity to western grid
- Land Requirement
  - Develop conceptual configuration of solar project buildout
    - Consider providing firm/dispatched solar power by adding battery storage to configuration
    - Develop initial cost estimates
  - Initiate environmental review of final buildout of solar project
- Purchaser
  - Participate in utility RFPs for renewable power
    - After configuration and initial cost estimates established
  - Discuss contracts with state and federal utilities
- Construction
  - Financing
    - With PPA (Power Purchase Agreement) for Navajo solar power contact lending agencies for funding for construction increments.
  - Order components for initial phases of project
  - Utilize Navajo workers for construction and maintenance

Arizona Transmission System



Advantages of Navajo Solar Project

- Solar project is compliment/supplement to existing NGS operation
  - Can replace lost NGS generation as it is phased out
- Stage able - can add solar generation as contracts/PPAs for power are signed and/or to replace NGS generation
  - Control expenditures based upon approved contracts for power
- Navaho Solar Worker Program can train Navajo workers to construct and maintain solar projects
- Staging construction based upon solar sales will allow for long period (10+ years) steady construction at the site

Navajo Solar Program – Nation Responsibilities

- Review and regulatory approvals for full buildout (2,250 MW)
- Develop training program for Navajo renewable energy workers
- Participate in PPAs/contract negotiations for sale of power
- Increment construction as contracts (PPAs) for renewable power are obtained.

Schedule

- Year 1
  - Develop conceptual plans for full buildout
  - Initiate environmental and regulatory review
  - Meet and discuss concept with Arizona utilities: Bureau of Reclamation, CAP, APS, SRP, TEP
  - Develop training program for Navajo Solar Workers
- Year 2
  - Participate in utility solicitations and contract negotiations
  - Develop contracts and PPAs
  - Train Navajo Solar Workers
- Year 3
  - Construction of first phase of solar project based upon realized PPAs and contracts
- Year 4+
  - Construction of additional phases of solar project as contracts/PPA warrant

Historic Solar PPA Prices

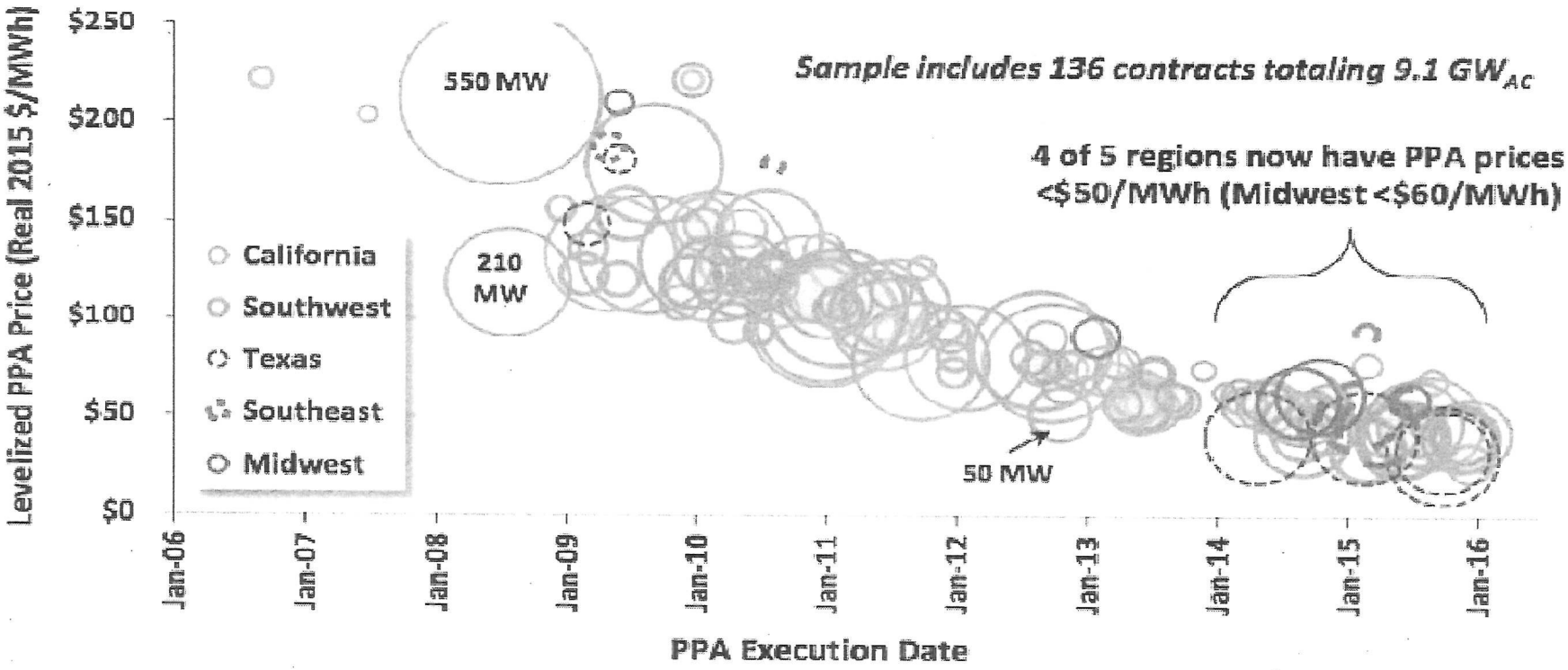


Figure 18. Levelized PPA Prices by Region, Contract Size, and PPA Execution Date: Full Sample

Arizona Utility Renewable Requirements

- The Arizona Corporation Commission (ACC) adopted final rules to expand the state's Renewable Energy Standard (RES) to 15% of total energy sold by 2025, with 30% of the renewable energy to be derived from distributed energy technologies. The compliance schedule is:
- 2017: 7.00% (30% must come from distributed energy resources - DR)
- 2018: 8.00% (30% DR)
- 2019: 9.00% (30% DR)
- 2020: 10.00% (30% DR)
- 2021: 11.00% (30% DR)
- 2022: 12.00% (30% DR)
- 2023: 13.00% (30% DR)
- 2024: 14.00% (30% DR)
- 2025: 15.00% (30% DR)

Other Renewables Requirements

- CAP / Bur Rec
  - Under the NGS Technical Working Group proposal the United States' share of energy produced by NGS would be replaced by energy generated from renewable resources
    - The replacement of 250 MW of NGS energy would require about 1,000 MW of solar generation
- California
  - California utilities have to obtain 33% of total electricity from renewables by 2020, 50% of total electricity from renewables by 2030.

Program Advisor

- Dr. Lon W. House, former chief utility planner for California Public Utilities Commission and utility planner for California Energy Commission
- Resides in Tucson
- Owner of Water and Energy Consulting – providing consulting services to electric utilities and water agencies for 25 years
  - www.waterandenergyconsulting.com
- Offices in Tucson, AZ and Folsom, CA

NEWS

Curated power industry news from thousands of top sources.

Newest Popular **News Article**

NEWS ARTICLE 0

Tucson Electric Power plans 800MW of new renewable energy by 2030

April 9, 2017 • 174 views • start a discussion • follow

Source: CNEgypt

Utility company Tucson Electric Power announced Wednesday that it is taking new steps to develop a more responsive and sustainable resource portfolio for the future.

The company filed its 2017 Integrated Resource Plan (IRP) with the Arizona Corporation Commission (ACC), shedding light on TEPs plans going forward.

TEP plans to continue to diversify its generation portfolio by expanding its solar and wind generation with a goal set to provide at least 30% of its power from renewable resources by 2030 twice the number required by 2025 under Arizonas Renewable

TEP also expects to add about 800MW of new renewable energy capacity by 2030. The company is also looking at proposals for a new 100MW PV project that would be built and owned by a project partner.

David G. Hutchens, TEPs president and chief executive officer, said: Were evolving from a traditional utility to a more technology- and consumer-focused provider of energy products and services while maintaining reliability, convenience and affordability for our customers.

Our plan recognizes the continued financial and operational benefits of owning Units 1 and 2 at the Springerville Generating Station, Arizonas most efficient, cost-effective coal-fired power plant. However, renewable energy, energy efficiency and cost-effective natural gas technologies will play an increasingly prominent role in our future resource plans.

TEP also expects to make greater use of energy storage systems, with the company already completing three energy storage projects with a combined capacity of 22MW. TEPs 2017 IRP also outlines the companys plans to retire and replace some of its coal-fired generating resources.

TEP will lose 170MW of coal-fired capacity when Unit 2 at the San Juan Generating Station in New Mexico is shut down at the end of 2017. The company plans to stop using the plant entirely when the current coal supply agreement ends in June 2022, cutting another 170MW of coal-fired capacity.

Explore Related Topics:

#clean-power #utility-business

Discussions

No discussions yet. Start a discussion below.

Sign in to Participate

DRAFT - May 11, 2017

Moving Forward: Planning and Financing an Economic Transition Following the Closures of the Navajo Generating Station and Kayenta Mine

By Tom Sanzillo, Director of Finance, Institute for Energy Economics and Financial Analysis

Executive Summary

This proposal provides recommendations for a nuts-and-bolts plan to find new jobs, new revenues and new economic growth for the people and communities who will be hurt by the closures of the Navajo Generating Station and Peabody Energy's Kayenta mine which supplies it.

The plant's current utility owners have stated their intent to close it because it is no longer competitive in the marketplace. The Institute for Energy Economics and Financial Analysis analyzed the plant's poor financial performance and weak financial outlook in our May 2017 report, **End of an Era: Navajo Generating Station Is No Longer Economic.**

It now appears that negotiations between the plant's owners and the Navajo Nation will result in a decision to keep the plant open until 2019. However, some of the parties involved have discussed the possibility of selling the plant to new owners and attempting to keep it open longer. IEEFA projects that a bailout of up to $2.4 billion would be required to keep the plant open through 2030. If this were to occur, ratepayers and taxpayers would pay for the losses through higher taxes and higher electricity rates.

There is a better way to use this public and private money to support the local economy than to subsidize the operations of the plant and mine. The period over the next three years before the plant closes can be used to implement a solid economic transition plan. Well-planned transition efforts, such as those that have been conducted many times in the U.S., by the Department of Defense, can avoid a significant amount of job loss, public income loss and community disruption.

IEEFA proposes a plan to address three critically important areas: jobs, fiscal balance, and economic growth. Implementation of the plan would rely upon the cooperation and goodwill of business, tribes, labor, and public agencies. The plan relies upon existing private and public investment and strategic uses of additional public dollars.

The premise of IEEFA's plan is that every employee of the plant and mine should receive a new job at comparable wage and benefit levels to existing employment, and that no

worker need miss a day's pay. Where possible, job opportunities will match current job skills. Where desired, employment training resources can lead to new job opportunities. We propose a plan for fiscal stability and balance to protect the Navajo and Hopi communities and enhance existing services and employment provided by tribal governments. Finally, we offer a strategy for economic growth that enhances existing state and local initiatives.

Recommendations

IEEFA is recommending a structure and approach for economic transition planning that would provide the following:

New Jobs for People Affected by the Plant and Mine Closings

IEEFA estimates that at least 643 employees from the plant and mine will need to find new jobs, and that a currently unknown number of people employed by supporting businesses may need new employment. We estimate that the current owners of the plant and mine (four utilities, Peabody Energy, and the U.S. Bureau of Reclamation) will be able to provide a substantial core of replacement jobs that require skill sets similar to those of the existing workforce at the Navajo Generating Station and Kayenta mine.

Between them, the current owners are likely to have 2,347 job openings in the next three years.

In addition, we estimate there will be 26,681 job opportunities[1] at large employers in the county and state during their normal course of business over the three years. These include energy-related work but also encompass the rest of the Arizona economy.

Fiscal Support for the Tribal Budgets

The Hopi and Navajo tribes receive a total of $51 million per year in revenue payments from the Kayenta mine, which will cease when the mine closes. This transition plan provides $55 million in annual replacement revenues for the Navajo Nation and Hopi Tribes. It achieves this financial objective by using targeted federal financial assistance for a minimum five-year period to smooth the transition.

Support for Short and Long Term Economic Growth

The plant and mine are economic engines for the area. This plan addresses the short-term needs of existing businesses that will lose customers and revenue, community planning efforts designed to create new businesses and new large-scale economic growth projects in the renewable energy and infrastructure areas and beyond.

Many aspects of the plan follow the models created by the U.S. Department of Defense. This is particularly appropriate in this situation because of the federal government's role as a part owner of the Navajo Generating Station and of the special

[1] Job opportunities include those new jobs created as a function of business and economic growth and new openings from projected job turnover. See Table I.

relationship between the tribe, federal government and Peabody Energy with regard to the coal.

We propose that implementation of the plan be overseen by an executive board, made up of representatives from: 1) Arizona's business community including coal interests; 2) Federal representatives that provide agency, executive and legislative leadership functions; 3) State, county government and representatives of higher education; 4) Tribal leadership; 5) Union and employee leadership. The board would hire a staff to execute its policy directives.

Cooperative leadership, solid planning and efficient organization and execution are the cornerstones of this action plan.

This plan is less expensive than the alternative: a bailout for the owners of the plant and the mine. It will require less time at one-sixth the expense of the estimated $2.4 billion bailout though 2030. This transition plan costs $113 million in the first year and declines over a five-year period. Over the next five years, it would cost between $345 and $375 million.

End of an Era: Navajo Generating Station Is No Longer Economic

Keeping the Plant Open Through 2022 Would Require a $740-Million-to-$1-Billion Subsidy; Keeping it Open Through 2030 Would Require a $1.4 to $2.4 Billion Subsidy

May 2017

Institute for Energy Economics and Financial Analysis
IEEFA.org

By David Schlissel,
Director of Resource Planning Analysis

Table of Contents

Executive Summary

The outlook for the Navajo Generating Station, a 2,250-megawatt coal-fired electricity-generation plant in northern Arizona, is bleak.

Declining energy market prices and rising production costs have made the power produced by the plant more expensive than power sold in the larger energy market. NGS, in a word, is no longer competitive.

These factors are not likely to change, leaving the plant's financial viability in doubt—regardless of who owns it. A substantial subsidy will be needed to keep the plant operational

The plant, which is situated on land owned by the Navajo Nation, is owned jointly by the Salt River Project (SRP), the U.S. Department of Reclamation, the Arizona Public Service Company, Nevada Power, and Tucson Electric Power. Barring a viable agreement that could delay retirement until 2019, the utility members of this group—Arizona Public Service Company, SRP, Nevada Power and Tucson Electric—have voted to close the plant this year.

Three of those utilities—SRP, Arizona Public Service Company, and Tucson Electric—told the Arizona Corporation Commission in late April that they no longer require electricity from the generating station because they have access to cheaper gas-fired generation. The Central Arizona Project (CAP), the largest customer for NGS power, wants out as well; CAP managers say the agency could had acquired power in 2016 for $38.5 million less than it paid for power from the plant had it bought that power somewhere else. Both CAP and Salt River Project, which operates the plant, expect power from NGS will become even more expensive than market power in coming years.

Details around any potential bailout for Navajo Generating Station remain murky. Although it looks increasingly likely that an agreement will be reached to keep the plant operating until at least 2019, no bailout start or duration dates have been proposed, nor have any dollar figures been publically discussed. No source of bailout funding has been identified. IEEFA has analyzed three potential bailout scenarios, however, each based on different starting dates and durations and on ranges for future NGS operating costs and generation.

Our analysis here aims to determine the size of a bailout required to make the cost of power from NGS competitive with the market price of power at the regional Mead Hub.

We put the price of keeping NGS open from mid-2017 through the end of 2019 at $414 million. Extending that bailout to keep NGS operating from 2020 until 2030 would cost an additional $1 billion to $2 billion, meaning a total bailout of $1.4 billion to $2.4 billion would be required to keep NGS operating from mid-2017 through the end of 2030.

A five-year bailout plan from mid-2017 through mid-2022, as has been suggested by a member of the Arizona Corporation Commission, would cost $740 million to $1 billion.

In short, keeping the Navajo Generating Station online would require at least hundreds of millions of dollars in subsidies over the short term and billions over the longer term.

Background: Plant Location and Ownership

The Navajo Generating Station near Page, Ariz., is on leased land that is owned by the Navajo Nation. NGS Units 1-3 are each rated at a nominal 803 megawatts (MW) of nameplate capacity, with 750 MW of net capacity[1]. All of the units are over 40 years old (Unit 1, 43 years old; Unit 2, 42 years old; Unit 3, 41 years old).

Unless the plant is retired by 2019, it may be required either to close one unit or add expensive pollution control technology to meet the requirements of "regional haze" air pollution rules.

The plant is the sole purchaser of coal from Peabody Energy's Kayenta Mine, which is about 90 miles away.

The ownership of the plant is divided as follows: Salt River Project (42.9%), the U.S. Department of Reclamation (24.3%), Arizona Public Service Company (14%), Nevada Power (11.3%), and Tucson Electric Power (7.5%),

The Central Arizona Project (CAP) uses the federal government's share of the power to pump water from the Colorado River to Phoenix and Tucson.

Our analyses here are based on publicly available information filed by the plant's owners with the U.S. Department of Energy's Energy Information Administration and with the Federal Energy Regulatory Commission (FERC) and from industry information published by S&P Global Intelligence. The references to Navigant Consulting and Peabody Energy presentations refer to information provided at an Arizona Corporation Commission workshop on April 6, 2017.

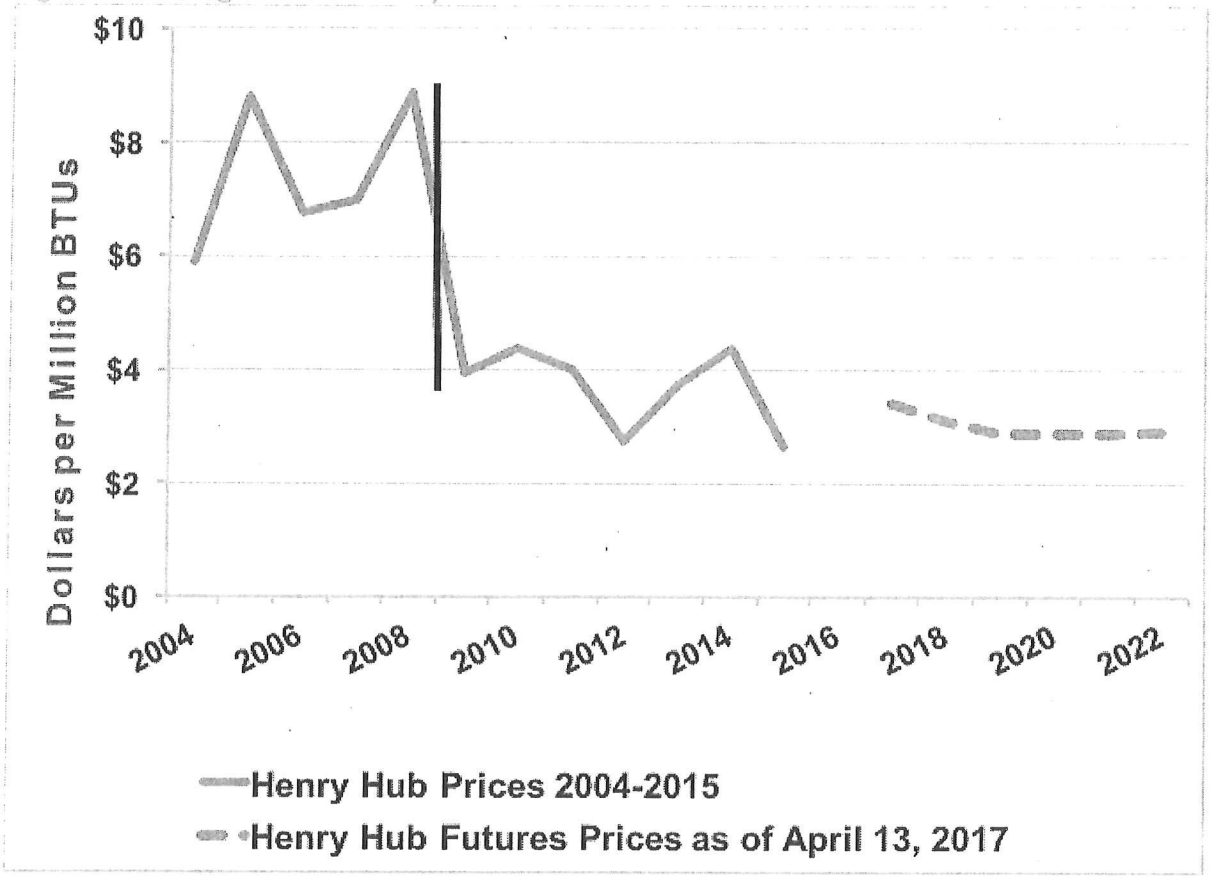
Market Forces Have Rendered NGS Uncompetitive

Nationally, the decline in the financial viability of coal plants and the retirement over the past few years of more than 250 coal-fired units have been driven by changes in the energy markets: very low natural gas prices, leading to low energy market prices; rising plant production costs; and declining generation due to increasing competition from renewable resources and higher generation at natural gas-fired units. These changing circumstances have made NGS less competitive with market power, a trend that will very likely continue in the coming years.

As shown in Figure 1, below, natural gas prices have fallen dramatically since 2008, and are expected to remain low for years to come. The map below shows Henry Hub prices, the national benchmark for natural gas prices.

[1] The difference between each unit's gross and net capacity represents its "parasitic" loads, that is, the power that is used to operate on-site equipment

Figure 1: Average Annual Henry Hub Natural Gas Prices 2004-2022.[2]

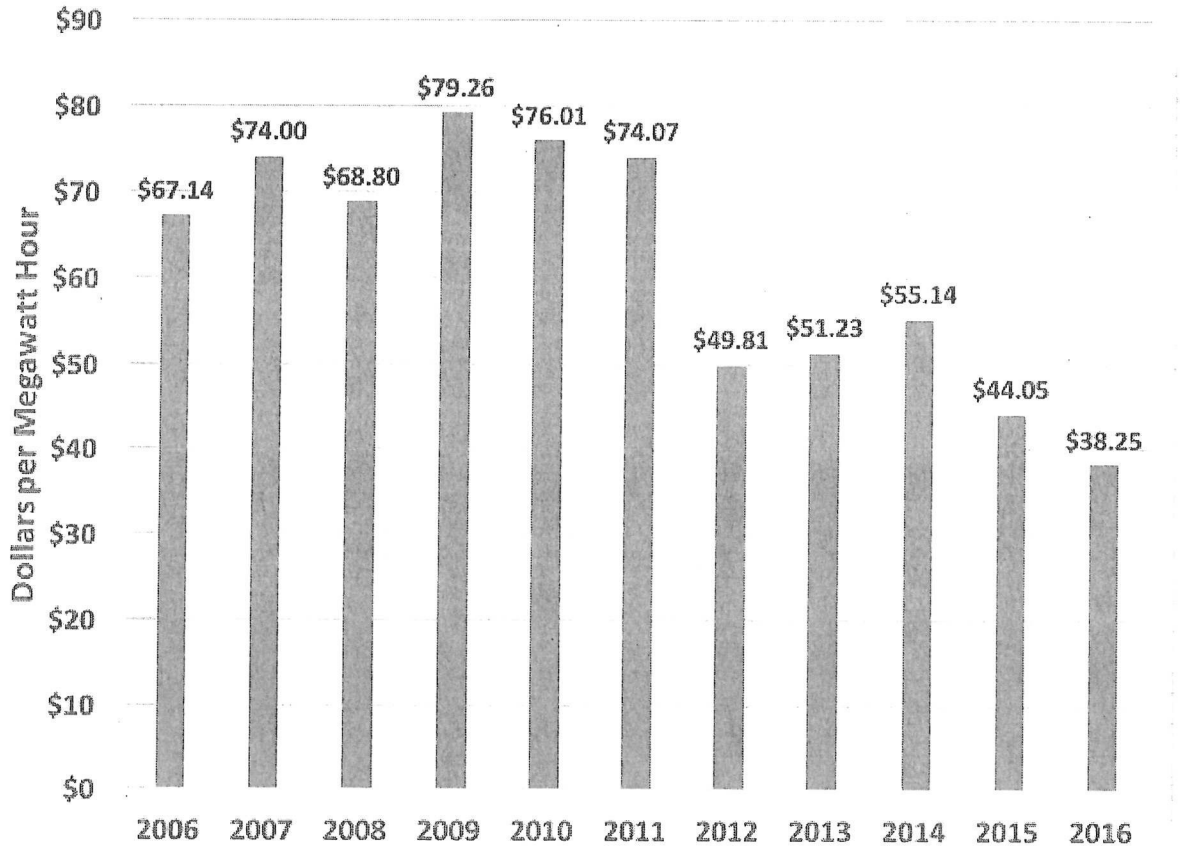


The natural gas futures prices in Figure 1 represent the prices at which gas can be contracted today for delivery that occurs months or years in the future. As such, they represent the market's outlook for natural gas prices. Although utilities and independent power producers in the Southwest do not purchase their natural gas at Henry Hub, the prices there are indicative of prices across the rest of the country.

Low natural gas prices have led to dramatically lower operating costs at gas-fired units, which have made them more competitive with coal-fired generators like NGS. Figure 2, below, shows the decline, over time, of the cost of generating power at Arizona Public Service Company's Redhawk gas-fired combined cycle plant.

[2] Historical natural gas prices from U.S. Energy Information Administration. Futures prices from OTC Global Holdings, as reported by SNL Financial.

Figure 2: Annual Dollar Per Kilowatt Hour Production Costs of APS's Redhawk Combined Cycle Plant.[3]

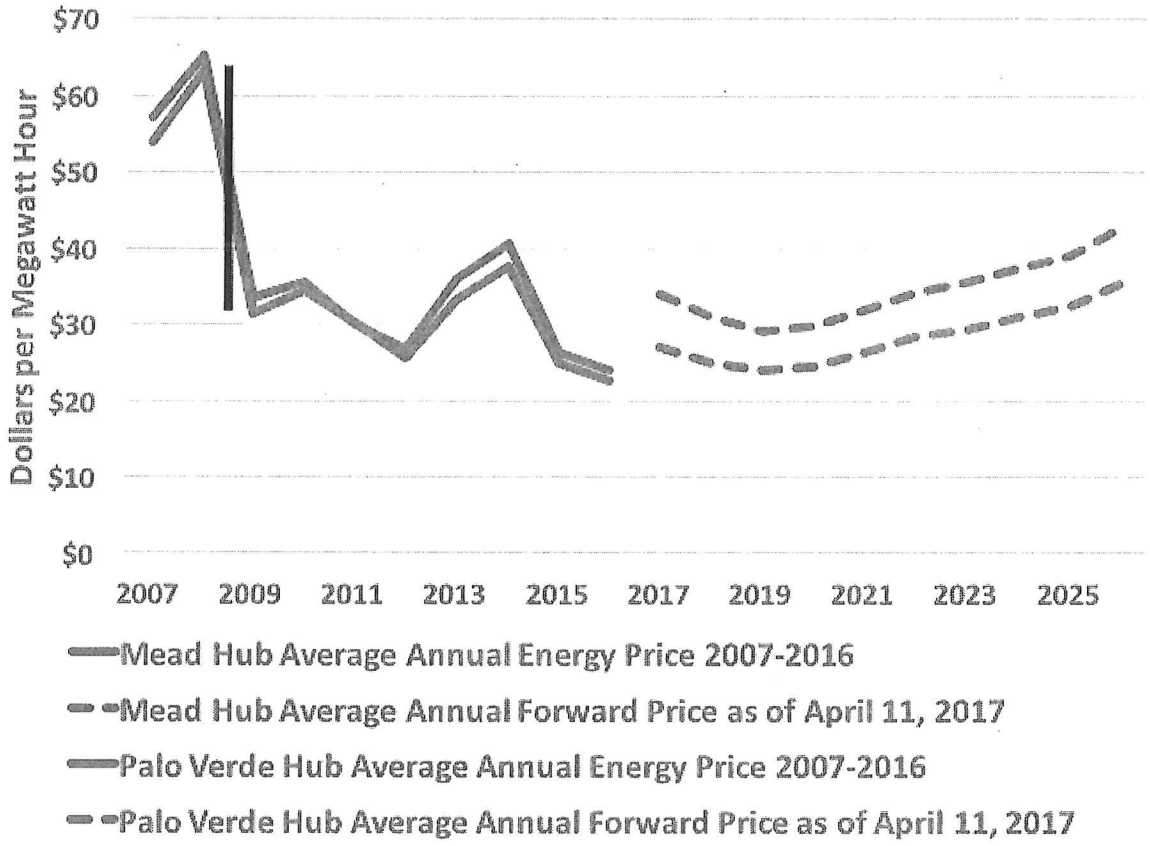


NGS connects to the grid at the Mead Hub, and it also competes with power plants that connect at the Palo Verde Hub. Because natural gas-fired plants set the market price of power during much of the year (including those at the Mead and Palo Verde Hubs), the steep decline in natural gas prices beginning in late 2008 shown in Figure 1 has been followed by precipitous drops in the wholesale power prices (see Figure 3).

Lower energy market prices mean utilities have less expensive options than NGS. Central Arizona Project has compared what it paid in 2016 for power from NGS to the price of market power at Palo Verde and found that it would have saved a total of $38.5 million by buying energy from the broader market instead of from NGS.[4]

[3] Source: Annual Arizona Public Service Company FERC Form 1 Filings for the years 2006-2016.
[4] Source: Central Arizona Project Power Task Force Report, "Impact of NGS Closure on CAP." Dated February 16, 2017.

Figure 3: Average Annual Wholesale Electricity Market Prices at the Mead and Palo Verde Hubs.

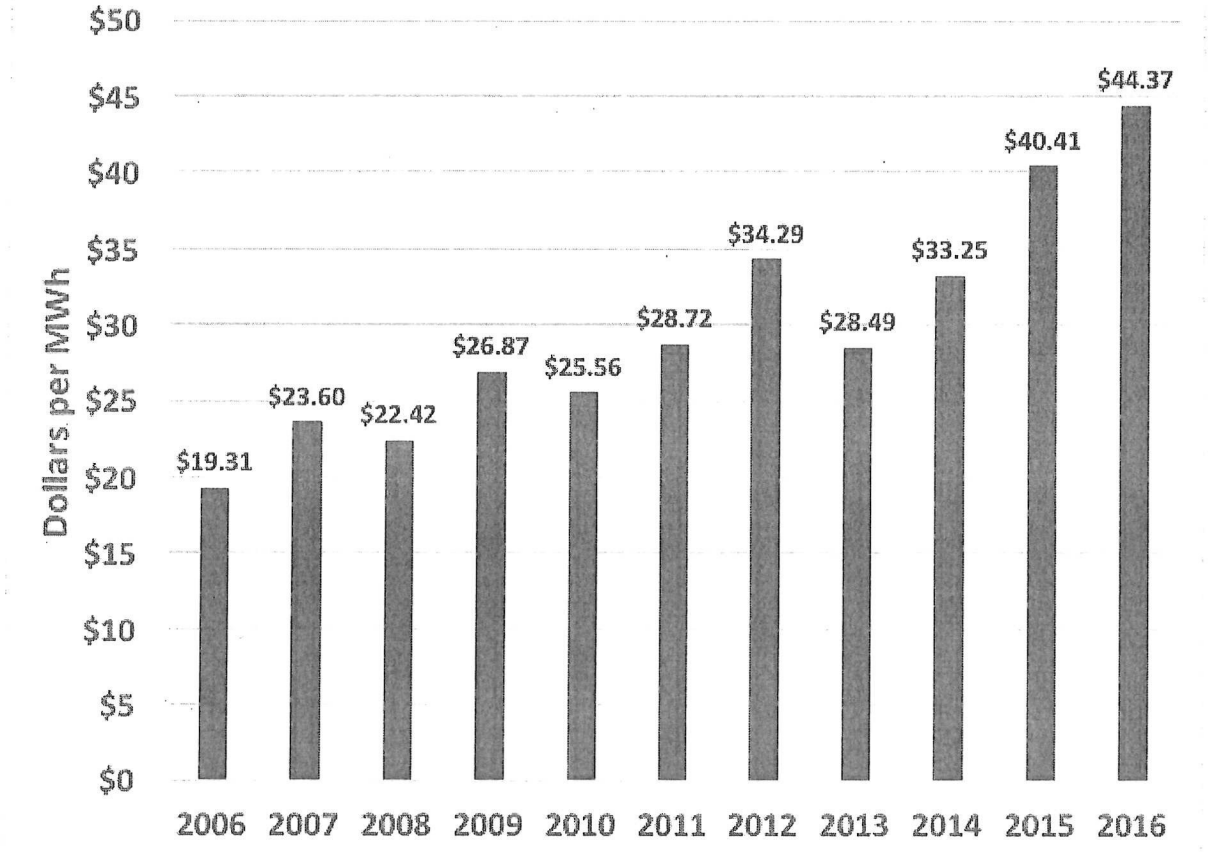


The forward prices in Figure 3 represent the prices at which power can be purchased today for delivery months or years in the future. As such, they represent the market's outlook for future energy market prices at the Mead and Palo Verde Hubs. The vertical line in Figure 3 represents the time in late 2008/early 2009 when natural gas prices collapsed, leading wholesale energy market prices lower.

As market prices for power have plummeted, the cost of generating power at many coal plants around the nation has increased. These rising production costs have made coal-fired units less competitive with natural gas-fired plants and renewable solar and wind resources.

Figure 4, below, shows the steep growth in the cost of generating power at NGS, as reported by Arizona Public Service Company in its annual FERC Form 1 filings.

Figure 4: Annual Navajo Generating Station Production Costs in Dollars per MWh.[5]



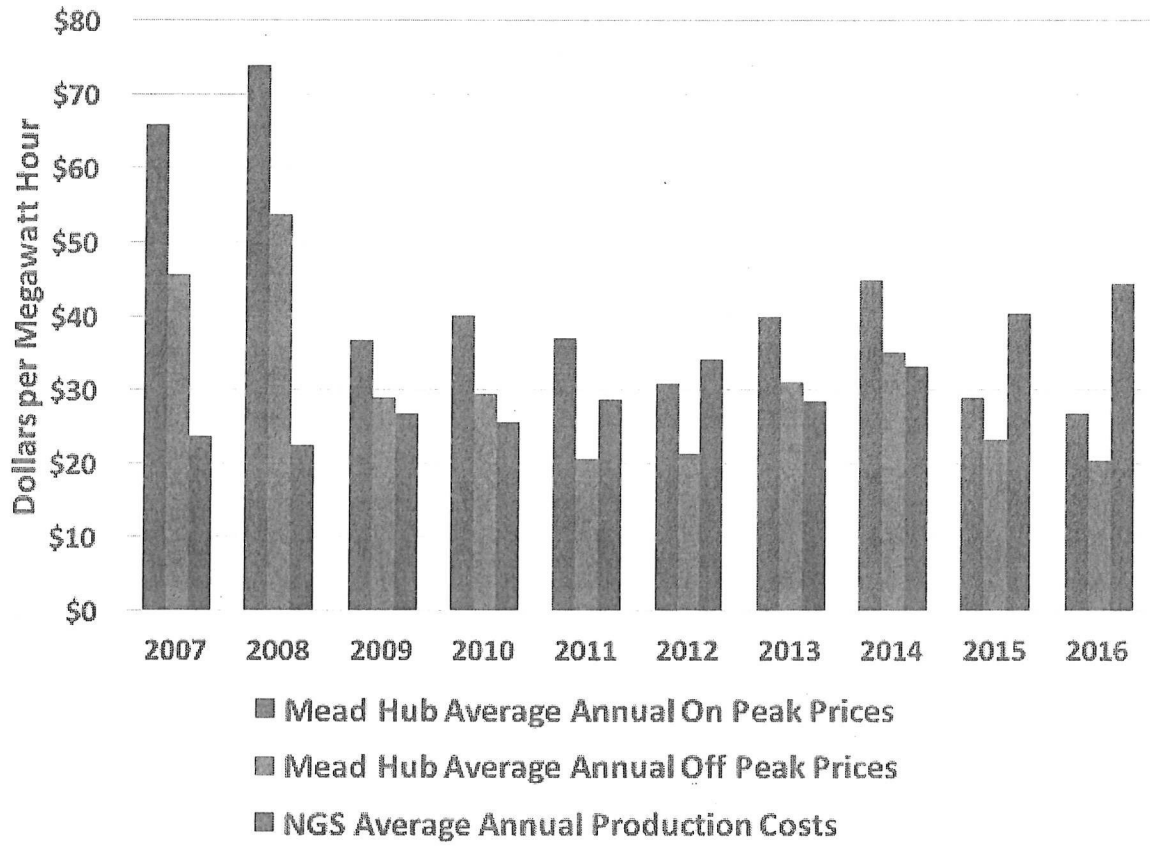
These increases represent a compound annual growth rate in the cost of producing power at NGS of almost nine percent per annum from 2006 through 2016.

Figure 4 reflects only NGS's annual operating & maintenance costs. In addition to these expenses, the plant's owners also have paid an average of $19 million each year for capital expenditures (capex) during the years 2006 through 2016.

The rising cost of generating power at NGS and the declining prices for power at the Mead Hub mean that power from the plant has become significantly more expensive than buying power from the market, as shown in Figure 5, below.

[5] Source Arizona Public Service Company annual FERC Form 1 filings for the years 2006 to 2016.

Figure 5: Historical Cost of Producing Power at NGS vs. Energy Prices at the Mead Hub.[6]



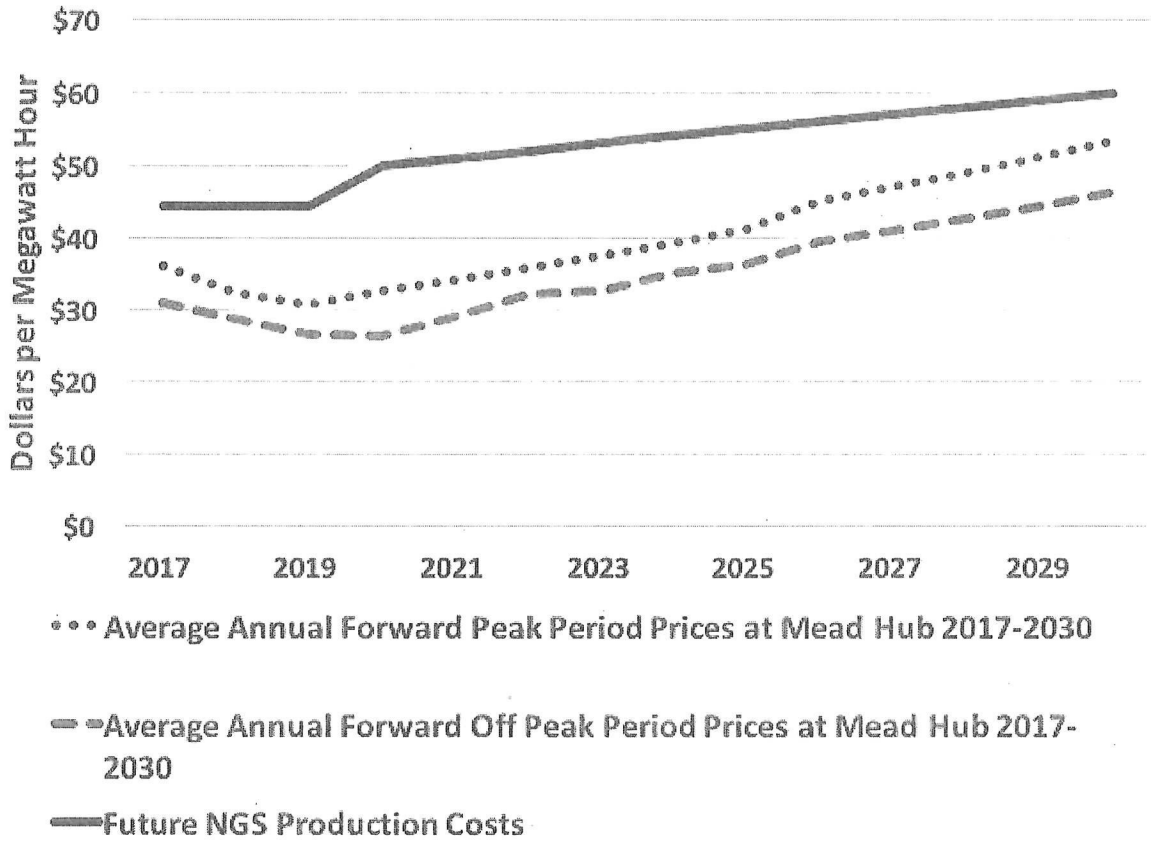
The average cost of producing power at NGS has been higher than average off-peak prices at the Mead Hub since 2012, except for a short period in 2013 and 2014 when the prices were relatively close.[7] The average cost of power at NGS was higher than average peak period prices in 2015 and 2016.

As shown in Figure 6, below, barring substantial and long-term subsidies, the cost of producing power at NGS is almost certain to remain substantially higher than the price of power at the Mead Hub.

[6] Source for NGS Production Costs is Arizona Public Service Company annual FERC Form 1 filings for the years 2006 to 2016. SNL Financial for annual energy prices at the Mead Hub.

[7] The fact that the prices were close in 2013 and 2014 means that the cost of producing power at NGS was higher than energy market prices at the Mead Hub for at least some, if not many, of the hours in those years.

Figure 6: Projected NGS Production Costs vs. Forward Energy Prices at the Mead Hub.[8]



The fact that the cost of generating power at NGS has risen above energy market prices has had two impacts on NGS and its owners, both of which threaten its viability.

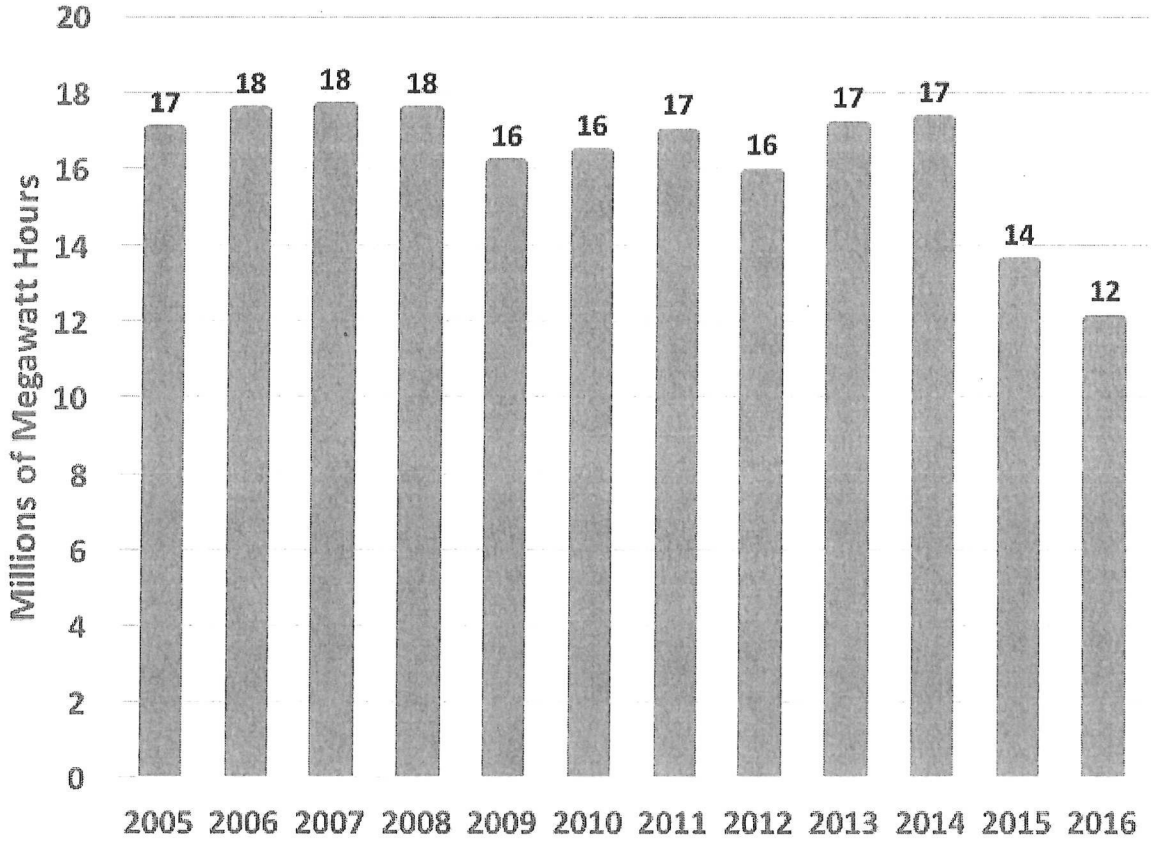
First, the price of the power being sold at the plant has not covered the full cost of producing that power—in other words, it is operating, on average, at a net loss for each of the megawatt hours of power it sells.

Second, as the cost of producing power at the plant has risen, and NGS has become less competitive with the cost of producing power at other generators in the market, the plant has begun to produce significantly less power in recent years than it had previously generated, as shown in Figure 7, below.

In these two ways, the interaction between NGS's rising production costs and declining energy market prices have undermined the financial viability of continuing to operate the plant.

[8] This Figure assumes that the average cost of producing power at NGS (not including Capex) will be $43.75 per MWh in 2017-2019. This was NGS's average production cost in 2016, as reported by Arizona Public Service Company in its annual FERC Form 1 Filing. The production costs for the years 2020 until 2030 reflect SRP's projection that NGS production prices would be between $50 and $60 per MWh.

Figure 7: Annual NGS Generation, 2005 to 2016.[9]

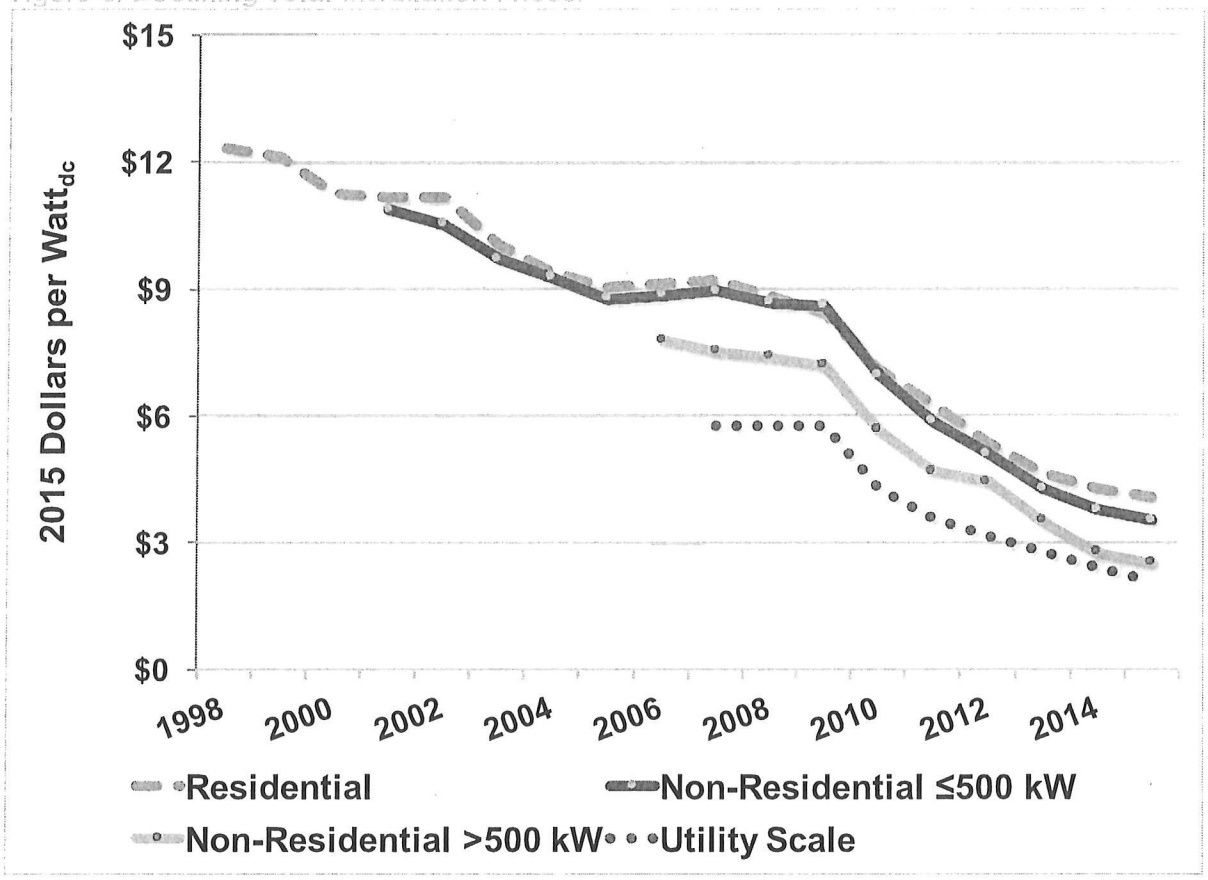


So far, the bulk of NGS's competition has come from low-cost natural gas-fired units. However, it is increasingly likely that higher generation from renewable resources in coming years will put even more pressure on NGS both by displacing generation that would otherwise have been generated at the plant and by keeping energy market prices low.

New solar installations costs have declined substantially in recent years, and further declines are expected in coming years. And solar, like wind-powered electricity generation, has negligible operating costs.

[9] Source EIA Form 923 Filings for the Years 2005-2016.

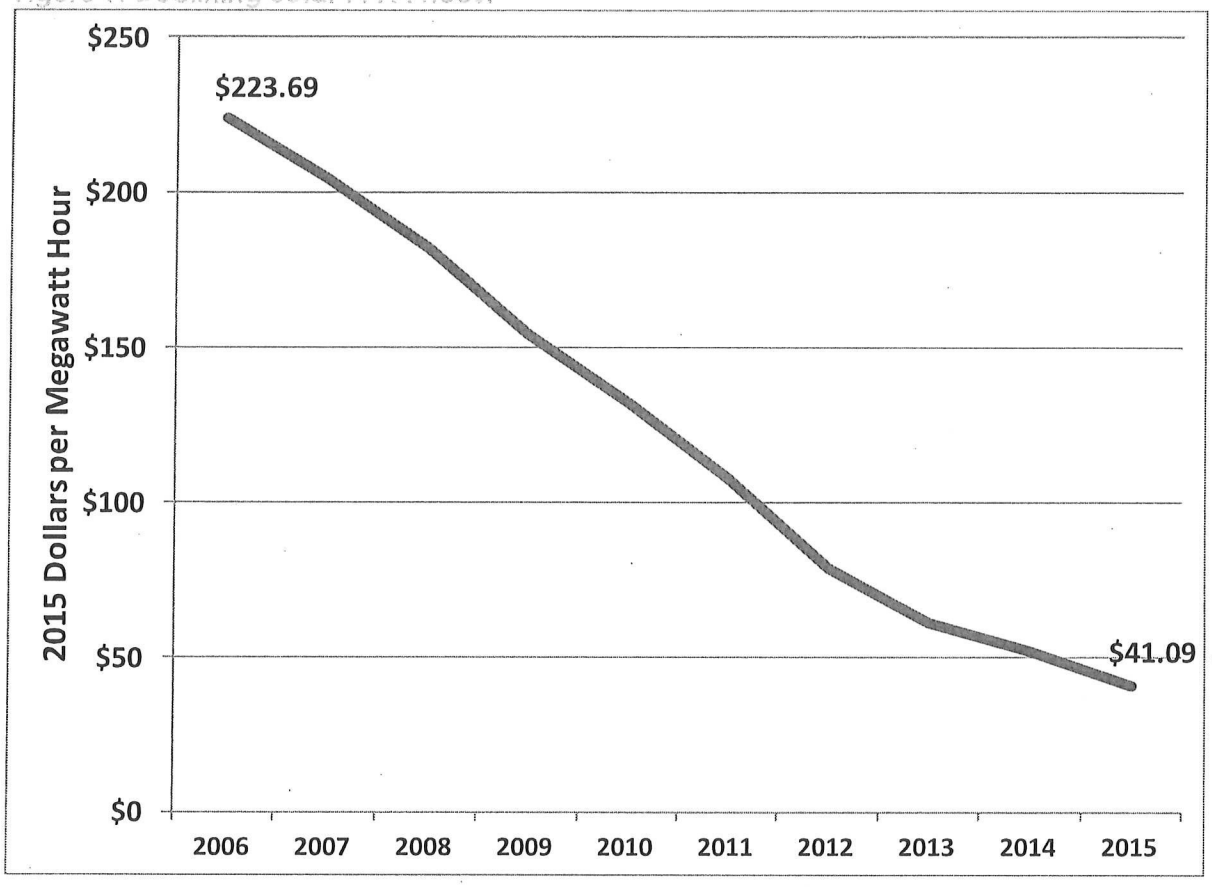
Figure 8: Declining Solar Installation Prices.[10]



As a result of these declining installation costs, solar power purchase agreement (PPA) coasts have declined precipitously, making solar an increasingly economic alternative to aging coal plants like NGS.

[10] *Utility-Scale Solar 2015: An Empirical Analysis of Project Cost, Performance and Pricing Trends in the United States*, Lawrence Berkeley National Laboratory. Available at https://emp.lbl.gov/sites/all/files/lbnl-1006037_report.pdf.

Figure 9: Declining Solar PPA Prices.[11]



Current expectations are that future solar PPA prices will decline further, with some analysts estimating PPA prices of $30 to $40 per MWh in the early 2020s, even without a solar investment tax credit.[12] Due to similar steep declines in installation costs and improvements in operating performance, wind PPA prices also have dropped and are now expected to go perhaps as low as $20 to $30 per MWh by the early 2020s and to do so with no production tax credit.[13]

Wind and utility-scale solar have no operating costs and, therefore, are dispatched ahead of fossil-fired plants. Thus, they displace the generation from and reduce the revenues earned by coal-fired units like NGS. At the same time, distributed rooftop solar photovoltaic resources and energy efficiency investments are putting downward pressure on coal plant revenues by reducing the demand for power. The addition of more solar and wind renewable resources will put ever greater pressure on coal plants in future years by (1) keeping energy market prices low and (2) by displacing generation that would otherwise be produced at NGS.

The bottom line, then, is that continued operation of the Navajo Generating Station is not financially viable given the competitive environment in which the plants would be operating.

---

[11] Id.
[12] UBS Global Research, *The Renewable Cost Deflation Trends Continue*, February 16, 2017. Available at https://neo.ubs.com/shared/d1X1OBuc7TKNdeG/
[13] Id.

A wave of market and economic forces including low natural gas, low energy market prices (at both the Mead and the Palo Verde Hubs), higher NGS production costs, annual capex at the plant, and increasing competition from low cost renewable resources will prevent NGS from being a profitable and long-term viable investment—by any owner.

There is no reason to expect that, without substantial subsidies, either the cost of producing power at NGS will be competitive with market prices or that the plant will generate substantially more power in the future than it has in recent years.

As three of NGS's current owners (Arizona Public Service, Tucson Electric and Salt River Project) recently have told the Arizona Corporation Commission to continue hold ownership in the plant because the Arizona has cheap gas-fired generation and because electricity from the coal plant is too expensive. They also report that it would cost their companies and ratepayers more to keep NGS open than to replace the capacity with gas-fired resources, of which Arizona has an abundant supply.

Another force at work against the financial viability of NGS is the fact that Arizona does not have a capacity market that can provide subsidies to an otherwise uneconomic generator. This is in comparison, for example, to the Midwest, where coal plants in the regional PJM and MISO markets receive capacity market payments whether their power is even needed. It hard to imagine any utility or other customer entering into any such agreement to pay for capacity from NGS—whether they use the power— and certainly not the three main Arizona utilities that have already said that they don't need or want to maintain their shares in ownership of the plant.

Enormous Subsidies Will Be Required to Keep the Plant Online

The amount and length of the subsidies that would be required to bailout NGS and make the cost of its power competitive with market prices depend on several factors: future plant production costs and capex; expected energy market prices at the Mead Hub and perhaps the Palo Verde Hub; how much power NGS can reasonably be expected to generate; and whether all three units would be run in coming years or if one unit would be retired to meet the Regional Haze agreement.

IEEFA's assessment then looks at four possible futures for the plant and determines a reasonable range for the bailouts that would be required to make and keep NGS competitive with natural gas and renewable sources of power.

NGS Plant Costs:

For the years 2017 through 2019, our analyses use an average NGS production cost of $44.37 per MWh. This is the average cost that Arizona Public Service Company reported for NGS in its 2016 FERC Form 1 Filing. These figures are conservative because they do not include any capital expenditures or escalation from 2016 through 2019. According to APS's annual

FERC Form 1 Filings, NPS-related capex averaged about $19 million per year from 2005 through 2016.

For the base case NGS production costs, starting in 2020 we use the recent projections from the Salt River Project, the plant's operator. These costs are between $50/MWh and $60/MWh during the years 2020-2030.

For a low production cost sensitivity, we have assumed that starting in 2020 NGS's fuel costs would be reduced by $2/MWh due to a $4 per ton (approximate 10 percent) reduction in coal costs. Peabody has been very unclear about how much of a reduction in the price of coal it is willing to offer to keep NGS running, and for how long. However, it appears from Peabody's April 6, 2017, submission to the Arizona Corporation Commission that it is willing to reduce the price of the coal it supplies to NGS by about 5-10 percent for at least a couple of years starting in 2020. For this reason, we believe that our assumption of a $4 per ton coal price reduction for the 10-year period 2020-2030 is conservative in favor of continued operation.[14] In this lower production cost model, we have also assumed that the plant's fixed costs could be reduced by $4 million per unit per year, as claimed by Navigant, a consultant working on Peabody's behalf. We have taken this tack to ensure we are being adequately conservative, even though neither Navigant nor Peabody have provided any evidence as to how realistic it is to assume that such a reduction in non-fuel operating costs actually could be achieved.

Energy Market Prices:

We use the current forwards prices for the Mead Hub in our assessment, even though, as was noted above, NGS also competes with resources that sell power at the Palo Verde Hub, which has lower energy market prices.

Generation:

We examine high- and low-generation scenarios. In our high-generation scenario (our "base case") we have assumed that in future years NGS will generate 12 million MWhs per annum — the same amount of power that it produced in 2016. In lower-generation scenarios we have assumed that starting in 2020 the plant would generate an average of only 8 million MWh each year. This reflects an assumption that one of the three NGS units could be retired by the end of 2019.

[14] Peabody's presentation before the Arizona Corporation Commission contains a slide that shows a "proposed extension pricing – fixed pricing" price of coal to the plant ranging from $40-$47 per ton during the period 2020-2025, an average of $42.75. There is no indication whether these prices purport to be a discount from current market prices (the presentation lacks prices for 2017-2019); whether the "fixed price" period exists for only five years; whether the "fixed price" would be the average $42.75 per ton or require a 17% increase over the five years from $40 to $47 per ton.

It may be that the assumption that NGS will generate even 8 million MWh per year is overly optimistic. The level of the plant's variable O&M costs may well make it uncompetitive to operate during many hours in coming years and, thereby, preclude its dispatching power. Reduced dispatch would mean lower revenues and would further undermine NGS's financial viability.

Period of Analysis:

There is great uncertainty as to when a bailout would start—assuming one does—and for how long it would be used to subsidize NGS's continued operation. For this reason, we have examined four possible bailouts. The first bailout we have looked at is what it would cost to keep NGS operating from mid-2017 through the end of 2019. The second bailout reflects what it would cost to keep the plant operating from 2020 until 2030. The third bailout is simply the total cost to keep NGS operating from mid-2017 through the end of 2030—in other words, the sum of bailouts 1 and 2. Finally, we have examined a potential bailout for five years, starting in mid-2017. This scenario is based on our understanding of the proposal being floated by ACC Commissioner Tobin.

We have ended the timeframe for any NGS bailout at 2030 because we believe it is extremely unlikely that the plant would, in any event, continue to operate beyond that date given the magnitude of the bailouts that would be required and the reasonable possibility that the plant's operating and maintenance costs will increase significantly as it ages and/or that its operating performance will degrade. There is no sense in speculating that NGS might possibly produce benefits in the far distant future after delivering $1.4 to $2.4 billion in operating losses through 2030.

Future Carbon Costs:

To be conservative too we have not assumed the imposition of future carbon costs in our analyses. However, we do believe that it would not be prima facie unreasonable to do so. In fact, although there is great uncertainty about the timing and stringency of any carbon-pricing regime, many utilities in their resource planning analyses assume that carbon dioxide (CO_2) will ultimately be priced under future regulation.

The losses that would be attributable to NGS, and the magnitude of any bailout that would be required to make the plant financially viable would increase significantly if carbon costs were to be included.

Summary of Assumptions

IEEFA prepared four different scenarios for each of the three time periods examined:

(1) The Base Case

Production costs of $44.37 per MWh in 2017-2019 and $50 to $60 per MWh between 2020 and 2030.

Annual generation of 12 million MWh.

Current Mead Hub forward peak and off-peak energy market prices.

(2) Base-Case NGS Production Costs With Lower Annual Generation Starting in 2020

Production costs of $44.37 per MWh in 2017-2019 and $50 to $60 per MWh between 2020 and 2030.

Annual generation of 12 million MWh in 2017-2019, reduced to 8 million MWh per year starting in 2020.

Current Mead Hub forward peak and off-peak energy market prices.

(3) Lower NGS Production Costs with Base Case Generation

Production costs of $44.37 per MWh in 2017-2019. Starting in 2020, production costs are reduced by $2 per MWh to reflect lower fuel costs and $4 million per unit per year to reflect non-fuel cost savings claimed by Navigant in its April 7, 2017, presentation to the Arizona Corporation Commission.

Annual generation of 12 million MWh in all years.

Current Mead Hub forward peak and off-peak energy market prices.

(4) Lower NGS Production Costs and Lower Annual Generation Starting in 2020

Production costs of $44.37 per MWh in 2017-2019. Starting in 2020, production costs reduced by $2 per MWh to reflect lower fuel costs and $4 million per unit per year to reflect non-fuel cost savings claimed by Navigant on Peabody's behalf.

Annual generation of 12 million MWh in the years 2017-2019, reduced to 8 million MWh per year starting in 2020.

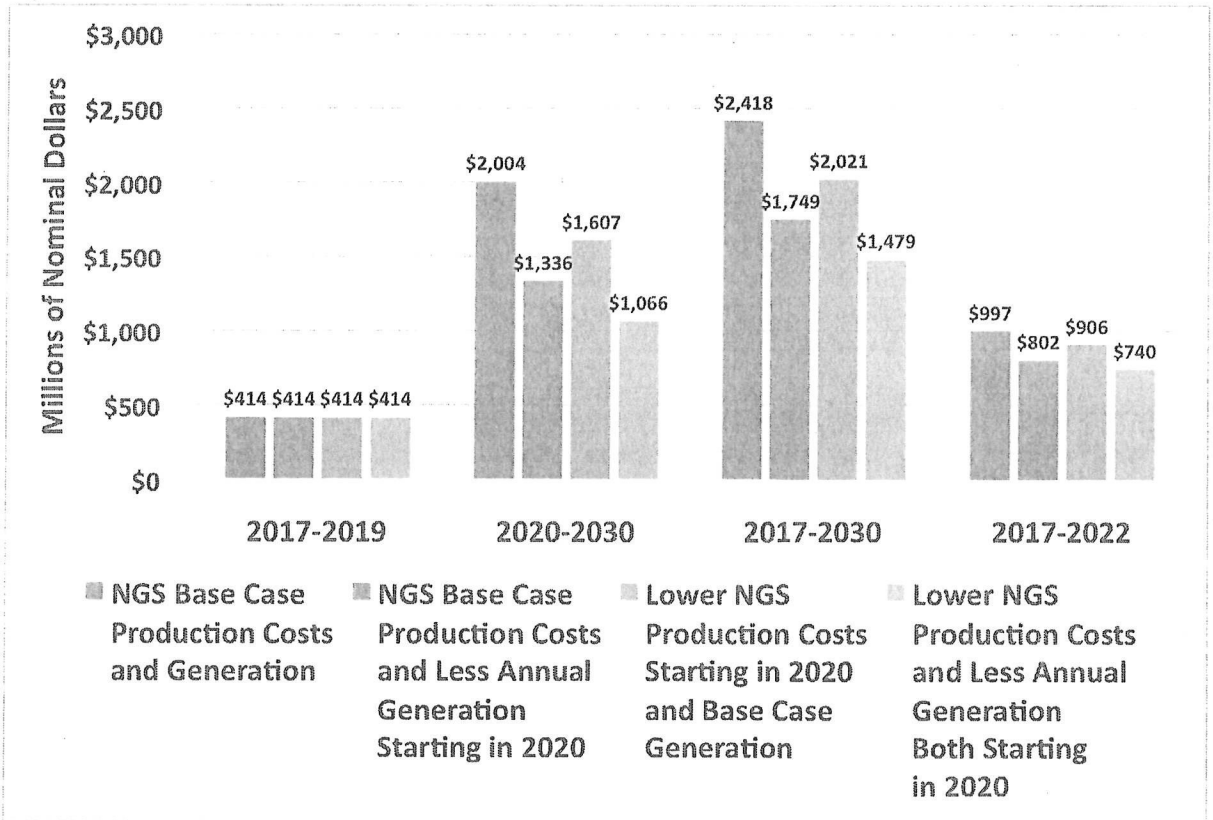
Current Mead Hub forward peak and off-peak energy market prices.

Table 1 and Figure 10 below illustrate our analysis.

Table 1 and Figure 10: Bailouts Required to Make the Cost of Power from Navajo Generating Station Competitive with the Cost of Market Power

	Millions of Nominal Dollars			
Scenario:	**2017-2019**	**2020-2030**	**2017-2030**	**2017-2022**
NGS Base Case Production Costs and Generation	**$414**	**$2,004**	**$2,418**	**$997**
NGS Base Case Production Costs and Less Annual Generation Starting in 2020	**$414**	**$1,336**	**$1,749**	**$802**
Lower NGS Production Costs Starting in 2020 and Base Case Generation	**$414**	**$1,607**	**$2,021**	**$906**
Lower NGS Production Costs and Less Annual Generation Both Starting in 2020	**$414**	**$1,066**	**$1,479**	**$740**

Figure 10:



Conclusion

Enormous subsidies would be required for Navajo Generating Station to continue operating under any owner.

Rather than spend such sums of money on a failing and aging coal-fired power plant, we recommend the plant's owners begin planning immediately for retirement of the plant and toward an orderly transition to a profitable and sustainable energy economy.

Institute for Energy Economics and Financial Analysis

The Institute for Energy Economics and Financial Analysis (IEEFA) conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy and to reduce dependence on coal and other non-renewable energy resources. More can be found at www.ieefa.org.

About the Author

David Schlissel

David Schlissel 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, 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 also has a Juris Doctor degree from Stanford University School of Law.

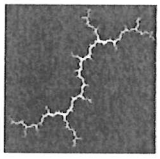
Chasing the Elusive Benefits of Navajo Generating Station

A Review of Peabody & Navigant's Navajo Economic Assessment

Prepared for Sierra Club

May 2, 2017

Jeremy Fisher, PhD



Synapse
Energy Economics, Inc.

485 Massachusetts Avenue, Suite 2
Cambridge, Massachusetts 02139

617.661.3248 | www.synapse-energy.com

1. INTRODUCTION

On February 13, 2017, utilities representing three-quarters of the ownership of Navajo Generating Station (NGS) voted to cease operations. NGS, a 2,225 MW coal-fired power plant just outside Grand Canyon National Park in northern Arizona was built in 1974. The plant acquires all of its fuel from the nearby Kayenta mine, owned by the Navajo Nation and operated by Peabody Energy.

On April 7, 2017 Peabody arranged a presentation before the Arizona Corporation Commission (ACC) to show an analysis the coal company had commissioned from Navigant. That analysis concluded that, over the period from 2020-2040, "NGS cost is projected to be $392 million net present value below the cost of market replacement energy and capacity," and that while NGS's profitability margins had "declined with gas prices in 2015 and 2016... [they] are expected to rebound with increasing gas prices going forward." The Navigant study provides extremely little detail on the basis of its analysis assumptions and underlying data, instead making generally blanket statements with respect to the validity of its assessment and critiquing independent analyses conducted by Salt River Project, the majority owner, and the National Renewable Energy Laboratory (NREL) on behalf of the US Department of Energy.

The study presented here is designed to examine the implicit and explicit assumptions of Navigant's analysis, and assess the validity of Navigant's conclusions with respect to the economic value of NGS. Our findings are as follows:

1. Navigant's derived benefit of NGS is overblown, relying on an assumption of a dramatic spread between coal and market energy prices in 2030. Navigant's own analysis shows little benefit for NGS unless the market recovers.
2. Navigant's study relies on either substantially reduced coal prices or an assumption that NGS can persist with substantially reduced maintenance expenses – or both – and does not reflect the reality of NGS operations over the last five years.
3. Navigant assumes that market energy prices will rise substantially starting in 2030, exceeding current utility assumptions by over 30% by 2037.
4. Navigant assumes that the market value of capacity will rise substantially starting in 2030, to the equivalent of market capacity prices only seen in the far more capacity-constrained PJM marketplace.

Overall, Navigant's assessment of the economic viability of Navajo is opaque, and relied on overstated market energy prices and substantially understated fuel prices for Navajo. Reviewing the elements of Navigant's assessment we find substantial problems, mounting up to **nearly $2 billion in errors**, faulty assumptions, and exclusions.

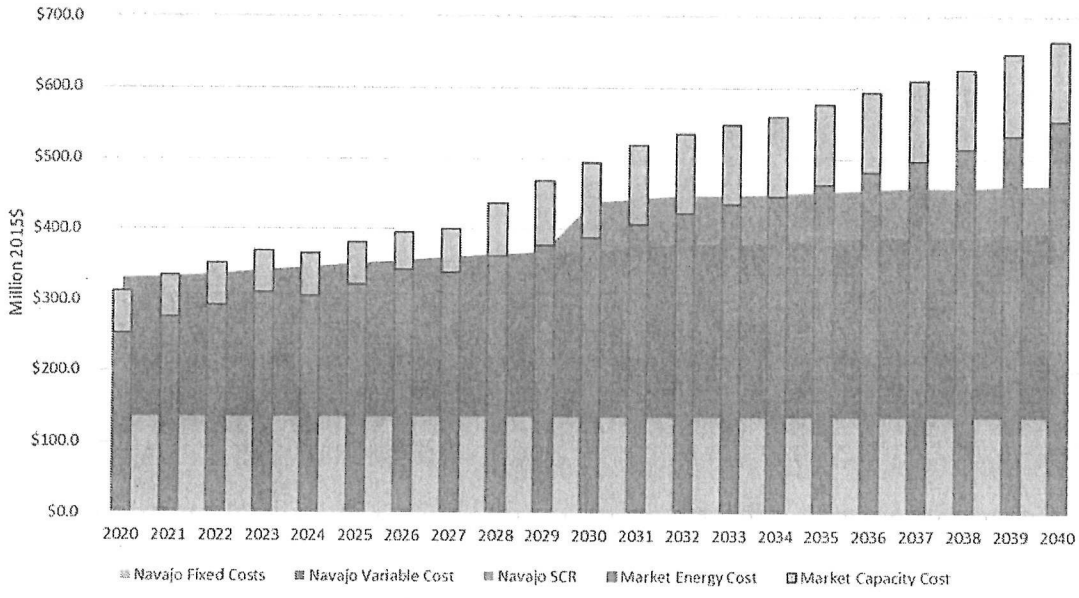
The following sections highlight each of the problems embedded in the Navigant / Peabody Energy presentation.

2. THE NAVIGANT/PEABODY ECONOMIC ANALYSIS

Navigant presented an economic analysis of Navajo power station from 2020-2040, with an estimated savings of $392 million relative to market energy and capacity.[1] Navigant's presentation is long on assertions, and short on disclosure. Fuel prices, operations and maintenance costs, energy prices, capacity price assumptions, the cost of capital projects incurred in 2030, and the assumed book life of those projects are all missing. Key financial assumptions – such as the assumed discount rate – are also missing. Even a basic question of if the values shown in Navigant's study represent two units at Navajo, or three, are not mentioned. From the perspective of reasonable resource planning, relied upon by utilities across the country and all of Navajo's non-federal owners, Peabody's presentation and Navigant's study fall short. As we show below, reverse engineering Navigant's study reveals unsupported and often erroneous assumptions.

The only quantitative information provided by Navigant is in a graphic, re-created in Figure 1, below, showing the equivalent market price of energy and capacity in excess of Navajo's costs by 2022.

Figure 1. Navigant/Peabody Energy Economic Analysis of Navajo Power Station



There are several immediately notable features of this analysis. First, even under Navigant's assumed pricing, Navajo barely breaks even on an annual basis until market energy and capacity prices begin

[1] Navigant NGS Study, page 17.

rising in the late 2020s. Second, Navigant shows market energy costs (the blue bars) well in excess of Navajo's variable cost of production ("variable costs") even in 2020.

The first feature, the long span until a break-even, is important in evaluating the risk of maintaining the plant. Even under Navigant's generous assumptions, Navajo doesn't start paying back substantially until the late 2020s, meaning that any owner would have to be willing to absorb the risk of stagnant energy prices or rising coal prices for another decade. Few new owners would be willing to take on such a risk profile, effectively betting ratepayer dollars on a market recovery.

The second feature, the high market energy costs in early years relative to the variable cost of production at Navajo, implies that Navajo should be making large energy margins today and through 2020, a fact that is belied by the falling capacity factor of the plant, and the losses being incurred by Navajo's owners today. In a recent presentation, Central Arizona Project (CAP) estimated that it "would have saved $38.5 million in 2016 by buying energy on the market instead of from NGS."[2]

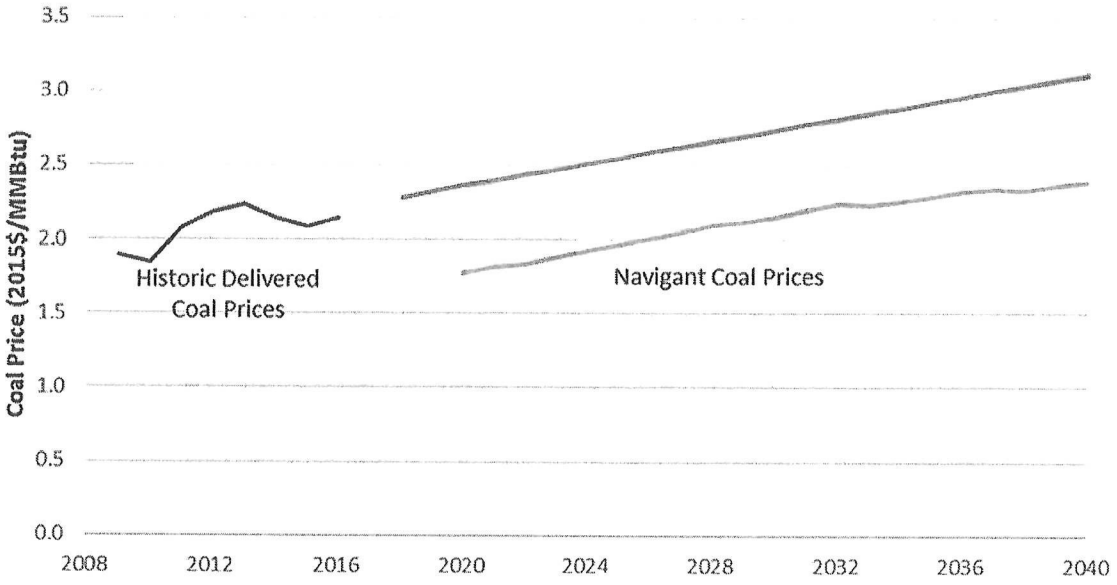
So how did Peabody and Navigant find such a substantial benefit in Navajo when all of the private owners have decided the plant is not in the best interests of their customers? The answer requires reverse engineering the Navigant presentation.

3. Navigant Study Relies on Unrealistically Low Fuel Costs

Navigant's presentation has a footnote that reads "Assumes Peabody proposed coal prices, with annual $2/ton carry on coal prices 2026 and later." A breakdown of Navigant's analysis shows that the consultancy ended up using coal prices substantially lower than historic delivered prices, only reaching Kayenta's actual delivered prices from 2016 in the year 2029.

[2] Central Arizona Project, February 16, 2017. Presentation to Power Task Force.

Figure 2. Coal fuel prices as delivered to Navajo Power Station 2008-2016,[3] as assumed by Navigant,[4] and extrapolated. 2015$/MMBtu.



A reasonable extrapolation of coal prices paid by Navajo to the Kayenta Mine (2008-2016) reveals a constant underpricing by Navigant of about $0.75/MMBtu. While this pricing difference may appear relatively small, the impact on the overall economics of Navajo is substantial. Replacing Navigant's coal prices with the extrapolated fuel price increases the relative cost of Navajo by $65-$80 million per year, or about **$620 million** (NPV 2020-2040),[5] completely erasing Navigant's assumed benefit for Navajo over the full analysis period.

In addition, Navigant appears to exclude any variable operating and maintenance ("O&M") costs, including the costs of reagents used in Navajo's scrubber, water consumed or day-to-day maintenance costs. Variable O&M may run about 25-30% of the total O&M expenses incurred at a steam boiler power plant. How do we know that Navigant excluded variable O&M? The extraordinarily low fuel cost shown in Figure 2 makes up the *entirety* of Navigant's variable cost of production. If Navigant had also included

[3] EIA Form 923, adjusted to 2015$ using BLS Consumer Price Index 2008-2016.

[4] Navigant presents aggregate annual "Navajo Variable Operating Costs," which are usually comprised of (at least) fuel costs, variable operation and maintenance costs, and any emissions allowance costs. Through a series of steps, we determined that Navigant had assumed, for the presentation on slide 17, all three units operating (2,250 MW) with a 50% capacity factor through all years. With this assumption, Navigant's near-term "replacement energy" prices match near-term market expectations (~$25.5/MWh in 2020), and the variable cost of energy at Navajo is about $20/MWh in 2020. Using an 11.1 MMBtu/MWh heat rate (EIA Form 923 and EPA AMPD data, 2016), we can assess this variable cost amounts to about $1.78/MMBtu, or about 15% lower than the actual costs paid to Peabody in 2016.

[5] Assumes a 6% real discount rate, reverse engineered from Navigant assessment. Uses Navigant assumed 3-units at 50% capacity factor assumption set.

a variable O&M cost, the implied coal cost would have been even lower, falling well outside the bounds of reason or about half the cost of the coal as reported to the Energy Information Administration (EIA).

Multiple sources show that the variable O&M costs associated with running a coal plant can be substantial. The US Department of Energy's National Energy Technology Laboratory (NTEL) estimates that, in general, coal-fired power plants cost about $5/MWh in addition to fuel costs.[6] These variable expenses include the costs for sorbents and chemicals, waste disposal, and water expenses, as well as maintenance costs incurred as a function of generation.

A review of federal filings from Navajo co-owners Arizona Public Service Company,[7] Tucson Electric Power,[8] Nevada Energy Company,[9] and Salt River Project,[10] suggests that Navajo pays about $3.80/MWh in variable O&M costs, apparently also not captured by Navigant. Figure 3, below, shows historic costs of fuel and variable O&M as reported to the Federal Energy Regulatory Commission (FERC) from Navajo participants against Navigant's total production costs. It shows that Navigant's assumed production costs in 2020 are lower than any entity reported in any year 2008-2016, and stay well below the average cost of Navajo in every year of the analysis.

---

[6] National Energy and Technology Laboratory. 2013. Cost and Performance Baseline for Fossil Energy Plants Volume 1: Bituminous Coal and Natural Gas to Electricity. Exhibit ES-7. https://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/OE/BitBase_FinRep_Rev2a-3_20130919_1.pdf

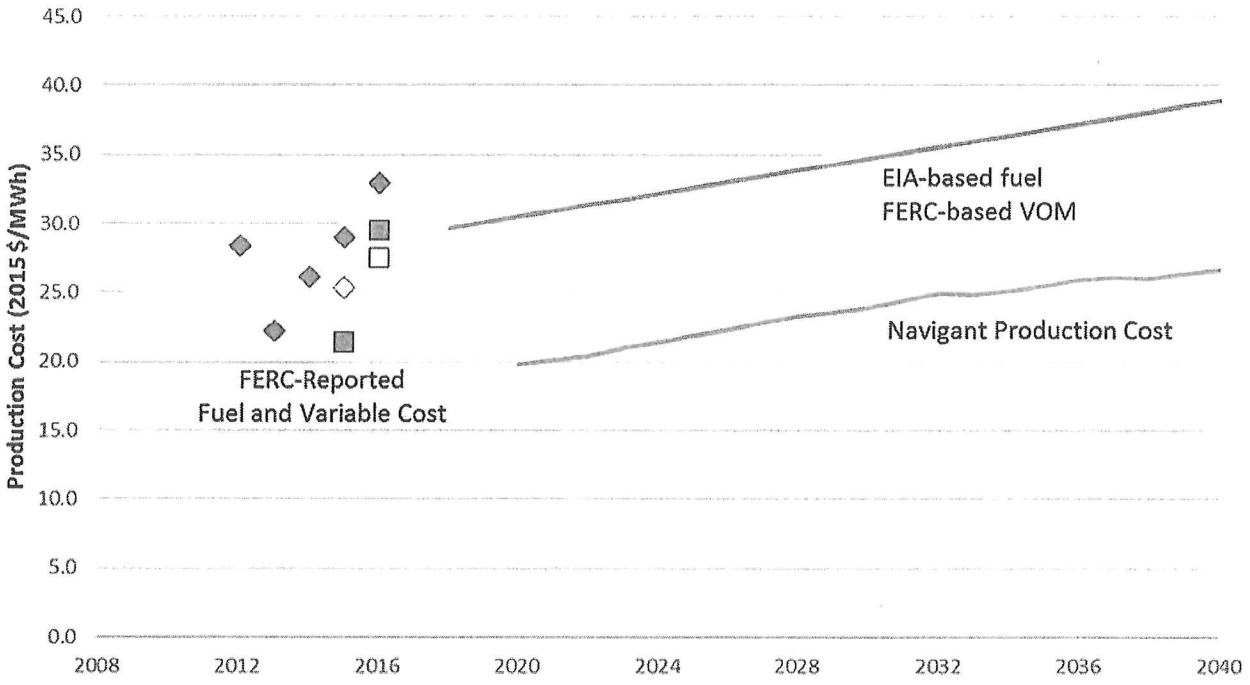
[7] FERC Form 1, 2012-2016

[8] FERC Form 1, 2015-2016

[9] FERC Form 1, 2015

[10] Direct correspondence (May 1, 2017), 2016 data.

Figure 3. Estimated production cost at NGS 2008-2016 from FERC Form 1 data,[11] as assumed by Navigant, and based on EIA and FERC forward-looking.[12] 2015$/MWh.



We assess that between fuel and variable O&M, Navigant excluded nearly $950 million in costs at Navajo (NPV 2020-2040). But these exclusions are only the start of the flaws in this study.

4. Navigant Study Inflates Out-Year Market Energy Prices

The Navigant presentation dramatically increased market energy prices towards the end of the analysis period, driving the substantial apparent benefits beyond the late 2020s. So how did Navigant derive their long-term market energy price forecast?

Navigant appears to have taken forward market energy prices for the Mead energy hub (Southern Nevada) and simply extrapolated them forward – apparently on the basis of the last two years of data, a

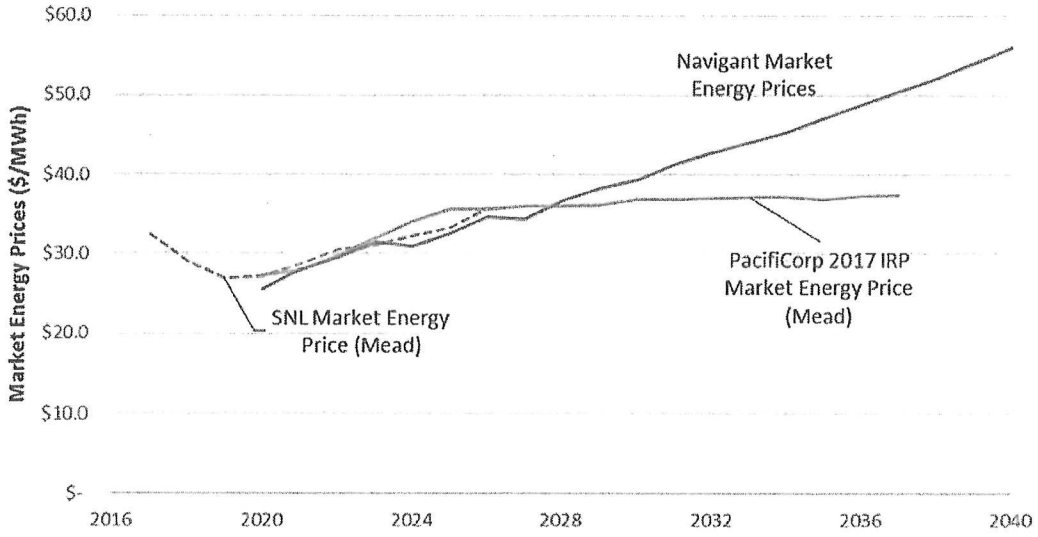
[11] EIA Form 923, adjusted to 2015$ using BLS Consumer Price Index 2008-2016. FERC Form 1 data from APS, TEC, NPC, and Salt River Project (direct correspondence). FERC Variable expenses assumed to include Electric Expenses, Misc Steam (or Nuclear) Power Expenses and Allowances.

[12] Based on extrapolation of EIA fuel prices (see Figure 2) and FERC-based VOM (held constant in 2015$).

reckless mechanism in a long-term forecast.[13] The aggressively rising cost of energy inflated energy prices in the out-years of the analysis, notably the period in which Navigant found the best benefits for Navajo Generating Station. Other market participants are not nearly as optimistic as Navigant, which imagined that energy prices will rise – in real terms – at a cumulative average growth rate of 6.1% year on year (nominal) through 2040, or roughly three times faster than inflation.

On April 4, 2017 PacifiCorp, a multi-state utility covering much of the intermountain west (UT, WY, OR, WA, ID, and CA) released its 2017 Integrated Resource Plan, and associated public work papers. PacifiCorp makes public its long-term forecast for market energy prices at multiple western hubs, including the Mead hub. PacifiCorp uses its long-term energy market forecast to make substantial resource decisions and, importantly, is completely divorced from the question of Navajo's economic viability. Figure 4 compares the market energy price in the Navigant study against near-term market forecasts from SNL, and long-term forecasts in the PacifiCorp 2017 IRP.

Figure 4. Market Energy prices in Navigant Study, forward-market prices from SNL Energy, and PacifiCorp 2017 IRP (April 2017).[14]



Comparing the PacifiCorp long-term "all hours" market price forecast[15] against Navigant's assumption indicates that Navigant's extrapolated forecast is extremely aggressive in out years, explaining the substantial increase in market energy costs in the Navigant analysis. Comparing the market price

[13] Navigant energy prices for the Mead Hub in $/MWh derived by taking total "Market Energy Cost" values and dividing by 2,250 MW at 50% capacity factor (9,855 GWh).

[14] PacifiCorp workpapers, Official Forward Price Curve (OFPC), adjusted with 2.2% inflation rate; ratable combination of High Load Hours and Low Load Hours for "all hours" price. SNL Energy Market forecast, Mead Hub; ratable all hours price from peak and non-peak forecasts, adjusted at 1.5% assumed inflation rate.

[15] Adjusted to 2015$ using a 2.2% inflation rate assumed in PacifiCorp's 2017 IRP.

differential between these two forecasts suggests that market energy price inflation results in a **$244 million** (NPV 2020-2040) excessive benefit in the Navigant study.

5. Capacity Values Equivalent to East-Coast Market Prices

The Navigant study assigns a market price to the capacity provided by NGS. Utilities in Western states are generally required to provide the capacity required by their customers – either directly or through a bilateral market purchase. There is no liquid market for capacity in the west, and thus very little market intelligence on the going price (or likely forward costs) for capacity. A capacity price – real or notional – only comes into play when capacity is limited or required; no market participant would pay a substantial fee for capacity when the market is flush.

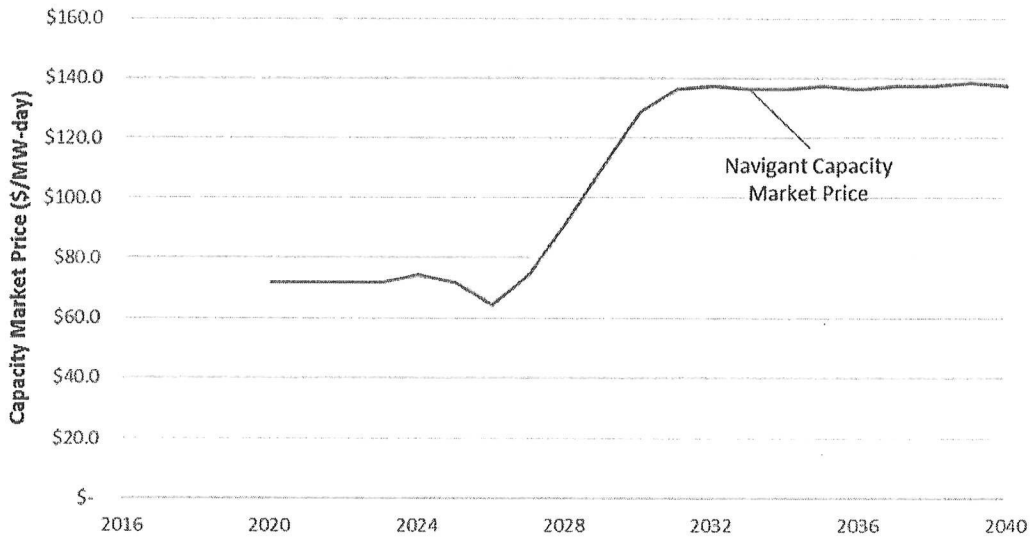
According to the North American Reliability Council (NERC), the Arizona/New Mexico region is expected to remain flush on capacity through at least the mid-2020s,[16] remaining above peak season reserve margins despite a number of anticipated retirements in the region.

Navigant, however, assumed that there is a substantial regional need for capacity today, and market participants are willing to pay $70/MW-day in 2020, or 46 times this year's actual market prices in the Midwest (MISO) region, which just cleared at $1.5/MW-day.[17] In fact, Navigant assumed that there is such an appetite for capacity that other utilities would be willing to pay nearly the full net cost of new entry (CONE) starting in 2030 (see Figure 5, below).

[16] http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/2016%20Long-Term%20Reliability%20Assessment.pdf

[17] https://www.misoenergy.org/Library/Repository/Report/Resource%20Adequacy/AuctionResults/2017-2018%20PRA%20Summary.pdf

Figure 5. Navigant capacity market prices in Navajo study, 2015$/MW-day.



Navigant's assumption about the appetite for capacity in the Southwest, and its inflated value to customers is an assumed benefit of **$755 million** (NPV 2020-2040), a benefit unlikely to be realized by any party.

6. CONCLUSION

Overall, we identify nearly $2 billion in faulty assumptions from the Peabody / Navigant presentation. Together, four major utilities and service providers – the Salt River Project, Arizona Public Service, Tucson Electric Power, and Nevada Power Company, and one of the largest customers, Central Arizona Project, determined operating Navajo today was a substantial loss of revenue, and operating Navajo into the future would burden customers with unnecessary cost and risk. Navigant's quickly executed and undocumented study notwithstanding, the owners of this plant made a rational choice for their ratepayers. The choice to exit a large plant like Navajo is a substantial step for vertically integrated utilities, and is not conducted lightly. Our re-assessment of the Navigant study affirms the decision of these utilities to exit Navajo, and demonstrates that Peabody's assessment is simply wishful thinking.