

Tribal Utility-Scale Solar Initiatives Advance Across Southwest U.S.

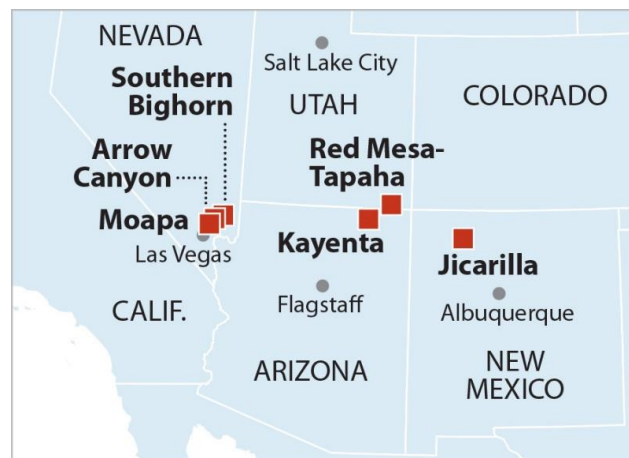
As Prices Fall and Markets Evolve, Deals Are in the Works on Underdeveloped Paiute, Apache and Navajo Lands

Overview

Tribal lands of the Southwest U.S. are far and away the largest single repository of utility-scale solar potential, but development of these resources has moved at an almost-glacial pace. Indications are that a paradigm shift is at work, however, as tribal interests begin to partner with developers that bring tax-advantage incentives to the table and with utility companies driven by the low cost of utility-scale solar; state mandates also in some instances are helping propel the uptake of renewable energy.

Three tribes are advancing the trend:

- In Nevada, the Moapa Band of Paiutes in 2017 blazed the tribal utility-scale solar trail with a 250 megawatt (MW) installation that supplies power directly to the Los Angeles Department of Water and Power (LADWP). The tribe is proceeding now with the development of two new solar farms, one 200MW and the second 300MW, that will provide power to NV Energy, the biggest utility in Nevada.
- In New Mexico, the first tribal utility-scale solar project on record, on Jicarilla Apache land, will send power via the Public Service Company of New Mexico to the City of Albuquerque as part of a larger plan to replace generation that will be lost in the closure of the coal-fired San Juan Generating Station, which has grown so uncompetitive as to be a drain on ratepayers. The Jicarilla project is a sign—like the Nevada projects—of things to come in one other respect: It pairs solar generation (50MW) with a storage component (20MW).
- In Arizona and Utah, the Navajo Tribal Utility Authority has partnered with the Salt River Project in Phoenix on a 55MW solar park that feeds into the regional grid, and the tribal utility has struck a deal with 16 Utah cities to buy electricity from a planned 66MW solar farm on tribal land in San Juan County, Utah.



All the deals are tied to long-term power purchase agreements (PPAs) that run from 15 to 25 years, and pricing on the most recent ones—ranging from roughly \$21-\$23 per megawatt-hour (MWh)—shows why utility-scale solar has become so attractive. Gas- and coal-fired electricity generation, by comparison, are much more expensive, as noted in Lazard’s annual levelized cost of electricity data. In its 2018 report, Lazard put the cost of coal-fired generation nationally at \$60-\$143/MWh and gas-fired generation at \$41-\$74/MWh. The unsubsidized cost for wind ranged from \$29-\$56/MWh, with the subsidized cost falling as low as \$14/MWh. Lazard estimated the unsubsidized price of utility-scale solar at \$36-\$44/MWh, an estimate that now seems behind the times.

Nor is there any question that tribal solar resources remain underdeveloped and that the opportunity for partnerships with developers and utilities is enormous.¹ While development on tribal lands can be complicated by issues that include ownership of grazing rights and tribal-government protocols, activity especially by the Moapa Paiute and the Jicarilla Apache show that solar energy can be done to scale on tribal lands and in ways that bring competitively-priced power to market.

A report published last year by the National Renewable Energy Laboratory, part of the U.S. Department of Energy, found that tribal and adjacent land nationally account for a disproportionate amount of renewable energy development potential.

“Utility-scale technical potential on tribal lands is approximately 6.5% of the total national technical potential,” the report concluded.² “(The tribal lands compose approximately 5.8% of the land area in the contiguous United States.) The technical potential doubles when considering tribal lands plus an extended area of 10 miles, which encompasses approximately 16.3% of the contiguous U.S. land area.”

The study—a must-read for policymakers, development companies and utilities—concludes also that the Navajo Nation easily has the greatest potential for wind and solar development (mainly in Arizona) because of its climate, its land mass and its proximity to existing transmission lines.

NREL estimated that only a little more than 400MW of installed renewable capacity existed as of last year on federally recognized tribal lands—297MW of it solar and 67MW wind (the rest was from biomass, geothermal and hydropower).

Other tribal areas with relatively smaller but still vast and largely undeveloped renewable energy resources include Cheyenne, Arapahoe, Kiowa, Comanche, Apache and Cherokee lands in Oklahoma, and Oglala and Lakota Sioux lands in the Dakotas. Tribal lands in Montana, Utah and elsewhere in Arizona are also candidates for utility-scale renewable power generation.

¹ IEEFA. [Growing Interest in Developing Navajo Utility-Scale Solar Industry](#). October 2018.

² NREL. [Techno-Economic Renewable Energy Potential on Tribal Lands](#). July 2018.

Activity in Nevada, New Mexico, Arizona, Utah

Moapa Paiute: Arrow Canyon Solar Project, Southern Bighorn Solar Project, Moapa Southern Paiute Solar Park (Nevada)

Two new Moapa Paiute utility-scale solar projects would be the biggest to date on tribal lands in the U.S. Both are supported by long-term PPAs with major utilities. Their construction follows the successful completion and operation of a 250MW solar farm that came online in March 2017.

In total, the Moapa Band of Paiutes counts 1,000MW (1 gigawatt) of utility-scale solar in operation or in development, though not all of that generation has been formally announced.

The new projects, **the 200MW Arrow Canyon Solar Project** and **the 300MW Southern Bighorn Solar Project**, will come online in 2022 and 2023 and are part of an industry push to lock up long-term deals in the sun-rich Nevada desert as power companies nationally chase more utility-scale solar deals. “This is just the beginning of a paradigm shift in our industry,” said one executive on the team that put the Arrow Canyon deal together.³

Arrow Canyon and Southern Bighorn have PPAs with **NV Energy**, a Berkshire Hathaway subsidiary and the main utility company in Nevada and core electricity provider for Las Vegas and Reno, the state’s two primary population centers.

As important, the deals include development partners with track records and market expertise. Arrow Canyon is being developed by **EDP Renewables North America**, which has roughly 6GW of wind, solar and storage projects operating in Canada, Mexico and the U.S. It is a subsidiary of EDP Renewables, which is one of the biggest renewable companies in the world and has a presence in 22 countries. Southern Bighorn is a project of **8Minute Solar Energy**, which has won regulatory approval for new utility-scale solar in California, Texas, the Southwest and the Southeast. It has completed deals with Southern California Edison, PG&E and the City of Los Angeles, among many others.

While much of the industry interest in the Southwest is market driven—Arrow Canyon’s PPA prices its power at \$21.26/MWh, Bighorn’s at \$23.52/MWh⁴—public policy has played a role as well. In April 2019, Nevada enacted a renewable portfolio standard that will require utilities to get 50 percent of their power from renewable sources by 2030.

Notably, the new Nevada projects are also paired with major battery-storage components—540 megawatt-hours (MWh) at Southern Bighorn and 375MWh at Arrow Canyon.

³ Bloomberg. [Massive Solar-Storage Project Is Planned for the Nevada Desert](#). June 2019.

⁴ NV Energy. [Before the Public Utilities Commission of Nevada](#). June 2019.

The Paiute project that came online in 2017—the **250MW Moapa Southern Paiute Solar Park**—is tied to a 25-year PPA that supplies electricity to the LADWP. The deal came about via a Southern California Public Power Authority request for proposals (RFPs) that drew 220 offers “from numerous firms having the capability to provide renewable energy from sources such as solar, wind, biomass, landfill gas, geothermal, hydroelectric, and other sources.”

A 2015 memo by LADWP officials noted that the main reasons the tribal project was chosen over competing bids was for advantages that included proximity to existing transmission facilities and “excellent solar resources.”⁵ The terms of the deal—negotiated in 2015 for \$81/MWh—illustrate vividly how prices of utility-scale solar have plummeted.

Tribal lands across the Southwest have advantages much like those the Moapa Paiute have put to good use for their utility-scale solar deals, which create local construction jobs, lease payments and knock-on economic benefits that include tribal tax revenues and benefits to local businesses.

Apache: Jicarilla Solar Project (New Mexico)

The **Jicarilla Solar Project** in north-central New Mexico entails construction of a 50MW utility-scale solar farm and a companion 20MW/80MWh battery-storage unit.

Jicarilla Solar is seen regionally as a pilot project of sorts—first, to test the marketability of utility-scale solar built on tribal lands in New Mexico, and, second, to position the participants—and ratepayers—to benefit from rapid gains in utility-scale solar technology.

Power from the project will be bought by PNM to support a new program, PNM Solar Direct, which will allow its larger customers, those with aggregate demand of 2.5MW or more, to buy solar power directly from the utility without having to do the contracting themselves. Under the terms of the PPA, PNM is paying \$21.73/MWh for the power.⁶

The 500-acre project, in Rio Arriba County, would be on land already set aside for business development, which is to say land unencumbered by grazing rights or other property claims that can complicate tribal-land development. The PPA, if approved by state regulators—as is likely—would be for 15 years and would include an undisclosed recurring lease payment to the Jicarilla Nation. About half of the power generated would go directly to the city government of Albuquerque under terms of an agreement between the tribe, the city and PNM.

⁵ LADWP. [Amendments to Power Purchase Agreement \(PPA\) No. BP 12-017 With K Road Moapa Solar, LLC \(K Road\) for Solar Capacity and the Purchase of the K Road Moapa Solar Generation Facility](#). December 2015.

⁶ PNM. [Application for Approval of PNM Solar Direct Voluntary Renewable Energy Program, Power Purchase Agreement, and Advice Notice Nos. 560 and 561](#). May 2019.

The project is proceeding against the background of the recently enacted Energy Transition Act (ETA),⁷ landmark legislation that creates a policy framework to move New Mexico aggressively toward rapid uptake of renewable power generation. The legislation, adopted in March 2019, requires that 20 percent of retail power sales by all utilities in the state be generated by renewables by 2020; forty percent by 2025; 50 percent by 2030; and 80 percent by 2040. The law, one of the most ambitious power-generation transition initiatives in the country, sets 2045 as the date by which electricity generation in New Mexico is to be 100 percent carbon-free.

PNM, which is the state's biggest utility, has moved in concert with the enactment of the ETA to retire the San Juan Generating Station, the source of about 30 percent of PNM's power. San Juan Generating Station is also the biggest coal-fired plant in the state and one of the last of its kind in the Four Corners area of the Southwest.

While PNM's route to closing the San Juan plant is not without controversy—the New Mexico Public Regulation Commission appears set to intervene on certain important aspects of how the closure will proceed—the utility seems intent on moving away from coal-fired power, which is no longer a competitive source of power generation.

PNM, in seeking approval to close the plant, has put forth a detailed plan to replace the 497MW of generation it owns at San Juan with a combination of new gas-fired generation and utility-scale solar. The Jicarilla Apache project is one of several components of that plan, which calls also for construction of a 300MW solar farm and 40MW/160MWh companion battery storage unit in McKinley County (Gallup); power-storage units of 40MW/80MWh and 30W/60MWh, respectively, at PNM sites in Bernalillo County (Albuquerque), and a 280MW gas-fired power station at the San Juan site itself outside Farmington—next to a companion 20MW solar field.⁸

These solar projects tap into rich and underdeveloped regional renewable resources, which include wind, especially toward the parts of New Mexico that adjoin Oklahoma and Texas, where the wind industry is an increasingly important segment of the energy economy. They also tap into a trend toward the uptake of utility-scale battery storage, which according to research presented in the San Juan closure docket⁹ and in line with research published by IEEFA¹⁰ and others,¹¹ is an increasingly inexpensive way to add resilience and operational flexibility to the grid.

Navajo Tribal Utility Authority: Kayenta Solar Facility and Red Mesa Tapaha Solar Resource (Arizona and Utah)

The **Navajo Tribal Utility Authority**, a branch of the Navajo Nation, embarked in 2014 on a modest but significant utility-scale solar initiative that includes the now-

⁷ New Mexico Legislature. [Energy Transition Act](#). March 2019.

⁸ PNM. [Consolidated Application for San Juan Generating Station](#). July 2019.

⁹ PNM. [Exhibit TGF-3, The Value of Energy Storage to the PNM System](#). June 2019.

¹⁰ IEEFA. [Advances in Electricity Storage Suggest Rapid Disruption of U.S. Electricity Sector](#). June 2019.

¹¹ S&P Global Market Intelligence. [Solar-plus-storage power plant development accelerates in the U.S.](#) October 2019.

operational 55MW **Kayenta Solar Facility** in northeastern Arizona and a new 66MW project in the works called **Red Mesa Tapaha Solar Resource** in southeastern Utah.

The Kayenta complex came online in two phases, in June 2017 and in August 2018. The project was developed in partnership with **Salt River Project**, an Arizona state agency/utility company that provides power to the Phoenix area. Kayenta's electricity goes directly into the regional power grid. Financial details around the Kayenta Solar Facility are not readily available, but NTUA's general manager has said the project has generated "significant dollars back to the Navajo Nation government."¹²

NTUA's other announced solar project, in San Juan County, Utah, is scheduled to come online in June 2022 under a notable deal that includes a \$23.15/MWh PPA with 16 members of the **Utah Associated Municipal Power Systems (UAMPS)**. The 25-year deal allows for 2 percent annual price increases.

NTUA is said to be "in the process of developing additional solar resources on and off the reservation,"¹³ although little is known publicly as to how far along or how serious the utility is on that front. One recent development of interest: A notice by SRP that the agency is "in discussion" for development of 200MW of "Navajo Nation solar."¹⁴

NTUA, because it is doing business primarily in Arizona and Utah, is getting little state-level policy help, as Arizona and Utah remain laggards policy-wise compared to New Mexico and Nevada. In 2018, Arizona Public Service Co., the biggest utility in the state, ran a successful campaign to defeat a ballot proposition that would have increased Arizona's renewable portfolio standard to 50 percent from 15 percent by 2030. Utah has no renewable energy mandate.

Navajo tribal interests are also struggling with policy matters of their own. For years, tribal government favored coal-fired generation like that from Navajo Generating Station, which is the biggest coal-fired power plant west of the Mississippi and has been in operation since the 1970s but will be retired this December. While leadership has stated a clear preference¹⁵ for development of renewable energy, the government of the Navajo Nation is currently at odds with the Navajo Transitional Energy Company, a tribally owned company that has avoided renewable-energy investments at the expense of moving instead this year to buy bankrupt coal mines in an ill-advised acquisition of Cloud Peak Energy distressed assets in Montana and Wyoming.¹⁶

¹² Cronkite News Service. [Tribally owned solar power plant beats skeptics, odds on Navajo Nation](#). August 2018.

¹³ UAMPS. [UAMPS members add solar energy to resource mix](#). July 2019.

¹⁴ SRP. [Power Committee meeting minutes](#). August 2019.

¹⁵ Navajo Nation. [Nez-Lizer proclaim clean renewable energy development as the Navajo Nation's top energy priority](#). April 2019.

¹⁶ IEEFA. [Proposed Navajo Acquisition of Bankrupt U.S. Coal Company Is an Ill-Timed Gamble](#). August 2019.

About IEEFA

The Institute for Energy Economics and Financial Analysis 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. www.ieefa.org

About the Authors

Karl Cates

IEEFA Research Editor Karl Cates has been an editor for Bloomberg LP and the New York Times and a consultant to the Treasury Department-sanctioned community development financial institution (CDFI) industry. He lives in Santa Fe, N.M.

Dennis Wamsted

An IEEFA analyst and editor, Dennis Wamsted has covered energy and environmental policy and technology issues for 30 years. He is the former editor of The Energy Daily, a Washington, D.C.-based newsletter, and is a graduate of Harvard University.

This report is for information and educational purposes only. The Institute for Energy Economics and Financial Analysis ("IEEFA") does not provide tax, legal, investment, financial product or accounting advice. This report is not intended to provide, and should not be relied on for, tax, legal, investment, financial product or accounting advice. Nothing in this report is intended as investment or financial product advice, as an offer or solicitation of an offer to buy or sell, or as a recommendation, opinion, endorsement, or sponsorship of any financial product, class of financial products, security, company, or fund. IEEFA is not responsible for any investment or other decision made by you. You are responsible for your own investment research and investment decisions. This report is not meant as a general guide to investing, nor as a source of any specific or general recommendation or opinion in relation to any financial products. Unless attributed to others, any opinions expressed are our current opinions only. Certain information presented may have been provided by third-parties. IEEFA believes that such third-party information is reliable, and has checked public records to verify it where possible, but does not guarantee its accuracy, timeliness or completeness; and it is subject to change without notice.