

Behind the rise of US utility-driven solar

US utilities | With federal support for renewables having been depleted in recent years, utilities in the US have taken a leading role in the deployment of solar and energy storage. Jules Scully examines how integrated resource plans are driving solar deployment.



Credit: Dominion Energy

As the US tilts towards a presidential election that will very much decide the country's path for the next four years, federal policy towards renewables and, indeed, climate action in general, hangs in the balance.

But in the absence of overarching federal policy, utilities in the US are increasingly taking matters into their own hands. Recent months have witnessed a slew of integrated resource plans (IRPs) published by utilities, each detailing ambitious plans to deploy swathes of solar and other renewables, as well as energy storage, in a bid to wrestle back control of climate action.

In a dramatic policy reassessment, Dominion Energy Virginia is now calling for the development and procurement of approximately 24GW of new renewable energy and storage capacity over the next 15 years – nearly quadruple the targets outlined in its 2019 IRP.

Announced in May, the latest proposal will see Virginia's largest utility look to add nearly 16GW of solar, 5.1GW of offshore wind and 2.7GW of energy storage. The backtrack followed the enactment a month previously of the Virginia Clean Economy Act, which called on Dominion to be carbon-free by 2045 and requires the closure of nearly all coal-fired plants in the state by the end of 2024.

"Solar and storage are going to be absolutely critical elements in order to help us achieve both our company's net-zero commitments as well as our legislative obligations," says Katharine Bond, Dominion vice president of public policy and state affairs, adding that the renewables targets are in part due to increasing requirements as a result of the Clean Economy Act.

Virginia is a "prime example" of the bottom-up climate leadership around the US being demonstrated by cities,

US utilities are making up for lack of federal leadership by procuring large volumes of clean energy generation and storage capacity

states, utilities and other subnational entities, Wendy Jaglom of Rocky Mountain Institute said earlier this year. "While we wait for federal leadership on climate, this is exactly the kind of expanded ambition and commitment needed to build the foundation for a comprehensive, all-in climate strategy that gets us on a path in line with the goals of the Paris Agreement," she added.

The Dominion case is part of a growing trend among US utilities that are decarbonising their power supplies, driven by state policies that support the energy transition, cost declines in solar and battery storage technologies, and corporations looking to procure additional green energy.

In New Mexico, a bill that mandates 100% clean power by 2045 was passed last year; PNM, the state's largest electricity provider, is targeting 100% emissions-free electricity by 2040.

Meanwhile, utilities Avista and Idaho Power are making up for the lack of policy in Idaho by both shifting to 100% clean energy by 2045. Despite the absence of state-wide renewable energy goals, the move will mean most of Idaho is being served by electric utilities intent on reaching 100% renewable energy. Idaho Power has also entered agreements to end participation in two coal plants and is exploring exiting a third — and final — coal plant.

According to the Smart Electric Power Alliance, 68% of all customer accounts in the US are now served by utilities with carbon reduction goals, including 27 utilities with ambitions to be carbon-free or achieve net-zero emissions by 2050.

The 'compelling' case for renewables

US utilities' move away from coal and even natural gas-fired power stations comes as the economic case for renewables becomes undeniable.

Around three-quarters of US coal production is now more expensive than solar and wind energy in providing electricity to American households, a study published last year by renewables analysis firm Energy Innovation revealed.

In Its New Energy Outlook 2019, BloombergNEF found that wind and solar are now cheapest across more than two-thirds of the world and that by 2030, they will "undercut commissioned coal and gas almost everywhere".

Still, reliability issues surrounding solar and wind power mean that some utilities will rely on natural gas and coal in the future. Dominion's latest IRP will see it develop 970MW of natural gas peaking generation to address these reliability concerns.

Alongside proposals to add up to 14GW of new solar capacity by 2038, the Tennessee Valley Authority is also eyeing anywhere from 2GW to 17GW of natural gas generation.

"The biggest concern is that US utilities are continuing to plan for billions of dollars investment in natural gas projects, even as coal plants are being retired in record numbers and renewables become more economical than ever," Devashree Saha, senior associate at the World Resources Institute, tells *PV Tech Power*.

With regards to utilities' reliability issues, Saha highlights the case of Northwestern Energy, which last year bought a 25% stake in a coal plant in Montana, citing reliability

concerns. The utility noted the investment would help it meet a winter peak capacity shortfall.

Saha says the already "very compelling" case for utilities to move towards renewables will be consolidated by technological advances that improve the levelised cost of energy for solar, wind and storage. Meanwhile, as clean energy projects increase in size, it will enable utilities to leverage economies of scale to further cut costs associated with equipment, operations and maintenance.

"My guess is that natural gas is going to enter this decade defined by intense competition with renewable energy whose fallen costs and rising deployment will undermine the economic case for gas as a bridge fuel," adds Saha.

This is backed up by a report from Rocky Mountain Institute (RMI) that warns of the "significant risk" of proceed-

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ing with planned investment in new gas-fired power plants due to the resulting stranded costs. As of September 2019, there was an estimated US\$90 billion of planned investment in new gas-fired power plants and over US\$30 billion in proposed gas pipelines.

By the mid-2030s, as clean energy prices continue to fall, building a new portfolio of clean energy resources will become less costly than continuing to pay the operating costs of a combined-cycle gas plant, the report notes, and such a portfolio will provide the same level of energy, capacity and reliability services.

Cost-effective battery storage

US utilities' move towards solar power has been boosted by the technological developments in and declining prices of battery storage, allowing power to be saved for higher demand periods.

PacifiCorp's 2019 IRP identified battery storage as part of a least-cost portfolio for

the first time in the company's history. It includes nearly 600MW of battery storage capacity by 2025, all located alongside new solar resources, and more than 2.8GW by 2038.

For Avista, which has a service territory covering parts of Washington, Idaho and Oregon, energy storage "will be key" to removing carbon-emitting resources from its portfolio, according to the utility's senior vice president of energy resources, Jason Thackston. "Our plans for combining long-duration pumped hydro, liquid air energy storage and lithium-ion technology provide the reliable capacity required to meet the demands of long cold winter periods when wind- and sun-dependent renewable resources are not always able to," he says.

Nevertheless, Dominion has cited limitations in existing battery technology as a reason for its natural gas expansion, while Idaho Power has not invested in long-term battery storage to date as a result of "costs and duration constraints".

According to Dennis Wamsted, an energy analyst at the Institute for Energy Economics and Financial Analysis (IEEFA), the development of battery storage technology has been two-pronged: its technical capability and its economic competitiveness. He says that combination is prompting an ever-greater interest in solar within the utility industry as companies "now realise they can shift part/all of the resource to times of the day when it is needed more".

"Contracts along these lines in the Southwest – with utilities signing power purchase agreements for solar-plus-storage projects that pay the provider significantly higher rates during peak demand periods than the rest of the day – give utilities the ability to rely on a given amount to solar power, turning the resource essentially into a dispatchable power source," says Wamsted.

Battery storage developments have not gone unnoticed by state legislators. Seven US states – New York, New Jersey, California, Nevada, Massachusetts, Oregon and Virginia – now have some form of energy storage target.

New York has set an energy storage goal of 3GW by 2030, and the state's six investor-owned utilities are required to conduct competitive solicitations to have a total of 350MW of energy storage resources in service by end of 2022. Thanks to its Clean Economy Act, Virginia goes further than any other state, with an energy

storage deployment target of 3.1GW by 2035, 2.7GW of which will be provided by Dominion Energy.

Corporations driving the transition

That 2.7GW figure may well have been influenced by the demands of tech giants such as Apple and Microsoft, which rebuked Dominion last year for the lack of both energy storage and solar energy included in an earlier IRP.

Some 10 companies, all of which operate data centres in Virginia, signed a letter expressing their concern regarding the intention of Dominion to meet their energy demand with “expensive” fossil fuel projects.

“When procured competitively, renewable energy allows us to save money, meet the expectations of our investors and customers and do our part to be more responsible stewards of the environment,” they said in the letter. The companies added that Dominion’s re-filed 2018 IRP failed to fully take into account the energy preferences of the data centre industry “by limiting the amount of competitively procured solar energy, neglecting to consider energy storage as a cost-effective and beneficial energy resource, and continuing to plan for the development of additional natural gas infrastructure”.

Led by the lofty ambitions of tech companies, corporations across the US increasingly have renewables procurement as part of their sustainability objectives. Globally, corporations bought a record amount of clean energy through power purchase agreements in 2019, up more than 40% from the previous year’s record, according to BloombergNEF. Most of this purchasing took place in the US.

Facebook topped the Renewable Energy Buyers Alliance’s list of largest US energy buyers in 2019 with a procurement of 1,546MW. It was followed by Google with 1,107MW and AT&T with 960MW.

“The rise in corporate interest in renewable energy (both wind and solar) is playing an increasingly important role in the broader transition across the US utility sector,” says Dennis Wamsted of IEEFA. “In many cases, companies now will refuse to relocate to a state or expand an existing facility if they are unable to secure green power for that project.”

The effect of that corporate demand for green energy has been felt in the small New Mexico town of Los Lunas, where construction of a Facebook data centre has not only lifted the local economy but also

accelerated the state’s transition toward renewable-powered electricity.

An IEEFA report details how a data complex that broke ground in 2016 – and is now being expanded from 973,000 to 3 million square feet – has increased municipal revenues, created local jobs and driven Public Service Company of New Mexico (PNM) to speed the buildout of utility-scale solar and wind across the state.

According to the report, one condition of the company coming to New Mexico was that it would have ample access to renewable power, and regulators have greenlit power purchase agreements for PNM to allow that to happen.

“While the state of New Mexico gave Facebook ample taxpayer-supported incentives to build at Los Lunas, such incentives are not uncommon, and they don’t always work,” notes the report. “What sets the Los Lunas example apart are its clearly beneficial local economic impacts and its market-moving renewable energy requirements.”

The data centre is driving a “rapid shift” toward renewable energy by PNM, which is projected to source 43% of its power generation from wind and solar by 2023, up from 9.7% in 2013, IEEFA said.

PNM spokeswoman Kelly-Renae Huber tells PV Tech Power that the utility sees its commitment to emissions-free energy as a driver of economic development to New Mexico. “Corporations that share this commitment are attracted to New Mexico because of the state’s vision for an energy transition,” she says, adding that solar and storage will form a major component in the company’s strategy to achieving an emissions-free energy future by 2040.

With the current vacuum of climate leadership at federal level, some US utilities and states are stepping into the void through their commitments to slash fossil fuel generation and transition to zero-carbon production. And as renewable energy prices fall and discerning electricity consumers continue to press for more solar and wind power, further utilities can be expected to join their ranks in the coming years.

‘No substitute for federal action’ on renewables

While utilities and states continue to implement and progress with their energy transition targets, the picture at federal level tells a different story, with the country a led by a president who once labelled climate change a hoax.

Donald Trump introduced tariffs on imported solar panels and modules in early 2019 to boost the fortunes of domestic manufacturers. While official reviews produced a mixed verdict on their effectiveness, the Solar Energy Industries Association (SEIA) claimed the Section 201 duties have caused “devastating harm” to the US solar sector.

An analysis by SEIA says the trade tariffs have prevented billions of dollars in new private sector investment, cost more than 62,000 jobs and meant that 10.5GW of installations have collapsed. Meanwhile, Wood Mackenzie estimates the duties have made the cost of solar modules in the US 79% higher than in major European countries and 85% higher than in China. The duties are due to phase out in early 2022.

Devashree Saha denies that actions taken by utilities can make up for the lack of support for renewables at national level. “There is no substitute for federal action,” she says. “The scale and timeline of the climate change problem requires that the federal government reengage and provide leadership.”

“As the United States looks to economic recovery and rebuilding in the shadow of COVID-19, investment in clean energy can be effective in creating jobs, growing the economy and protecting public health, not to mention reducing emissions.”

While Congress passed three stimulus packages to combat the effects of the ongoing pandemic earlier in the year, none of them directly addressed the needs of the renewable industry, and Section 201 duties remained in place despite a three-month relief for other US importers, as a result of a Trump executive order.

Recent legislative progress was made in the House of Representatives, where lawmakers in July passed the infrastructure bill, which includes an investment of more than US\$70 billion to help modify grids to accommodate more renewable energy sources. Nevertheless, it seems unlikely that the Senate will take up the bill, while Trump indicated he would veto it, saying the legislation “is full of wasteful ‘Green New Deal’ initiatives”.

Attention now shifts to the presidential election. Joe Biden has earmarked US\$2 trillion in spending to boost clean energy and rebuild infrastructure as well as help the US achieve a carbon pollution-free power sector by 2035 – a goal that goes beyond many of the most ambitious US utilities. ■