Wind and solar in limbo: Long waitlists to get on the grid are a 'leading barrier'

April 22 2024, by Nara Schoenberg, Chicago Tribune

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Ninety miles west of Chicago, the corn and soybean fields stretch to the sky, and dreams of the clean energy future dangle—just out of reach.

To the east of Route 52, there's the first phase of the 9,500-acre Steward Creek solar farm, in the works since 2019.

To the west, there's South Dixon Solar, which once hoped to begin construction on 3,800 acres in 2022.

Both projects have been approved by the Lee County Board. But neither can be built, according to a county official, due to PJM Interconnection, a powerful but little-known entity that controls access to the high-voltage electric grid in northern Illinois.

"There isn't anything we can do to help the state move forward (with its clean energy goals)," said Lee County Zoning Administrator Alice Henkel. "This is all PJM. They have the control."

As the clean energy transition surges ahead, with prices for electricity from wind and solar dropping and market share growing, long waitlists for new power sources seeking approval to connect to the electric grid have quietly emerged as a major barrier.

Across the nation, the waitlists for large projects to connect to the grid—and deliver power to homes and businesses—have ballooned, leaving over 1,400 gigawatts of wind and solar power in limbo, enough to allow the United States to achieve 90% clean electricity.

"We really shouldn't have this kind of breakdown in something that's so vital," said Mike Jacobs, a senior energy analyst at the Union of Concerned Scientists.

And nowhere is the problem worse, according to a recent first-of-its-kind report, than in the PJM region, which spans Washington, D.C., and 13 states, in whole or in part, including northern Illinois.

PJM came in last out of seven regions, with a grade of D-, in the Generation Interconnection Scorecard report prepared for the business association Advanced Energy United.

PJM's performance had "few bright spots," according to the report, which was based on publicly available data, as well as recent interviews with energy developers and engineers working in the field.

The report found that in a nation with "agonizingly slow" grid connection processes, the PJM process of studying and green-lighting new requests to connect to the grid was the slowest, with the most unpredictable timelines.

One clean energy developer was quoted as saying he had stopped doing new projects in the PJM region.

PJM's delays are severe enough to pose a significant risk to Illinois' ambitious clean energy goals, according to a 2023 report from the Natural Resources Defense Council.

"(PJM) has unnecessarily set our transition to cleaner energy back by years," said Clara Summers, the Consumers for a Better Grid campaign manager at the Citizens Utility Board.

PJM, a federally regulated private company that manages part of the high-voltage electric grid, declined a request for a phone interview, instead issuing a written statement saying the interconnection scorecard report "is an assessment of conditions and practices that no longer exist in PJM."

"Over three years ago, PJM and its stakeholders identified improvements to the interconnection process and developed landmark reforms in record time. These new rules are enabling PJM to process New Service

Requests faster and more efficiently," the statement said.

PJM said the "more relevant challenge" is getting previously approved projects built.

"This is the challenge we need to confront as an industry rather than looking back on problems that have been largely addressed," the statement said. "PJM is not delaying the energy transition."

But critics of PJM's operation say that delays continue.

While PJM points to 40 gigawatts of power that's approved but awaiting construction, there were 290 gigawatts of power waiting to connect to the PJM grid at the end of 2023, up from 88 gigawatts in 2018, according to Lawrence Berkeley National Laboratory, a federally funded research center.

A tidal wave

In Lee County, wind turbines sprout from cornfields, some as tall as skyscrapers.

There was heated debate when the state's first utility-scale wind farm was built here in 2003, Henkel said as she drove her SUV down quiet country roads.

But as time went on, farms continued to produce, the turbines did their jobs and concerns faded.

The county now has 280 wind turbines, with enough power to meet the electricity needs of roughly 200,000 homes.

"It works for this area," said Henkel. "We are contributing to green

energy and energy independence, so I'm proud of that."

Proposals for big solar projects started arriving here about five years ago, part of a national trend.

A tidal wave of renewable energy projects—driven by falling wind and solar costs and state and federal policies—was building, and heading toward the grid.

"It's happened really fast," said Joe Rand, an energy policy researcher at Lawrence Berkeley National Laboratory and lead author of Queued Up, a series of reports on the grid-connection waitlist. "We're in a rapid and fundamental energy transition in this country."

In the PJM region, the median time a new energy project had to wait before being allowed to connect to the grid rose to more than five years in 2022, up from just 20 months in 2005.

PJM effectively slammed on the brakes in 2022, with a decision, approved by regulators, that it would not review newer grid-connection requests—submitted after September 2021—until early 2026, according to government documents and PJM reports.

That allowed PJM to focus on clearing the backlog of older requests but left newer projects with potential waits of up to four years—just to begin the review process.

As part of a broader package of generally well-received reforms, PJM also went to a new review process in which grid-connection requests are studied in clusters, rather than one by one. Other changes included new financial requirements for applicants, aimed at discouraging speculative projects.

Among the local projects affected by PJM delays: Deriva Energy's South Dixon solar farm in Lee County, which applied to connect to the grid in 2019. According to PJM's timelines, the project should get an agreement to connect to the grid by mid-2025.

Phase 1 of Hexagon Energy's Steward Creek solar farm submitted its requests to connect to the grid in 2019 and 2020. The project should get an agreement by mid-2025.

"Having things dragged out—it certainly makes the development timeline a lot trickier," said Hexagon senior director of development Scott Remer. "It introduces risk to how we're going to continue to develop and mature the project."

Planning for the future

No one is saying that PJM's job is easy.

The Pennsylvania-based company—a membership organization that includes utilities and power providers—is the largest grid operator in the country, coordinating and directing the flow of electricity to 65 million people in a time of unprecedented change.

And PJM is by no means the only region struggling.

A recent report based on a survey of 123 wind and solar developers nationwide found that the grid-connection process was the top cause of delays of six months or more, followed by local ordinances and zoning, community opposition and supply chain issues.

At the Solar Energy Industries Association, senior director of energy markets and counsel Melissa Alfano said that the grid-connection process nationwide is a "huge" problem for big solar farms.

Rand said the issue has moved "to the forefront of the national energy conversation."

"(Grid-connection) has become the leading barrier to new power plants coming online and new renewables being deployed," he said.

There are more than 1,400 gigawatts of clean energy in grid connection waitlists nationwide, and 1,000 gigawatts of battery storage, or technology that collects energy for later use, according to the most recent Queued Up report.

That would be enough to take the United States to 90% clean electricity under current conditions, according to Nikit Abhyankar, a senior scientist at the Goldman School of Public Policy at the University of California, Berkeley.

However, Abhyankar cautioned that only about 19% of projects that enter the grid-connection waitlists end up being built.

Before the waitlists surged, about 24% of projects got built, according to the 2020 edition of Queued Up.

PJM, historically a leader among grid operators, entered the current era in a strong position. But critics say that while some regions have taken bold steps to meet the challenge of clean energy, PJM has moved more cautiously.

"Honestly, it's deer in the headlights behavior," said Summers, grid campaign manager at CUB.

California's grid operator—or PJM equivalent—has pursued a blue-state strategy of proactively planning the expansion of the high-voltage grid. That's helpful, experts say, because a right-sized grid allows new clean

energy to connect more easily.

In the Texas grid region, a red-state, free-market approach has also drawn praise: new projects can connect to the grid fairly easily, but bear additional risk that their power production may be curtailed if the energy supply exceeds demand.

Both regions earned overall grades of B in the interconnection scorecard report, the highest grades awarded.

PJM, in contrast, stuck to a "sub-par" process for studying grid-connection requests for far too long, the report said. And when PJM did make reforms, the transition to an improved process froze opportunities for new projects to be considered.

The report also gave PJM a low grade for forward-looking grid planning, in which strategically located long-distance power lines are built and upgraded to meet the growing demand for electricity.

Experts say that planning for the grid of the future—and building it—brings a multitude of benefits: It's easier for far-flung locations to access the cleanest, lowest-cost electricity; the risk of blackouts and other power interruptions diminishes; and adding new power sources is faster and less costly.

But today the United States is expanding the grid "in the most expensive way possible," via painstaking piecemeal additions, according to Rob Gramlich, president of the power-sector consulting firm Grid Strategies and a co-author of the interconnection scorecard report.

"It's very costly to just keep putting these Band-Aids on the system when there are huge economic efficiencies that come with higher-capacity lines and upgrades," Gramlich said.

Studies have repeatedly concluded that expanding and upgrading the high-voltage grid creates economic benefits, with a 2022 study in the journal *IEEE Transactions on Power Systems* finding that adding high-voltage power lines between huge, largely disconnected sections of the grid would create as much as $2.90 worth of benefits for every dollar spent.

PJM got a D+ for proactive grid-planning in the interconnection scorecard report.

The report did note PJM is finalizing a new long-term planning process. However, the authors wrote, it's not yet clear if the new process will lead to the kind of proactive expansion that would make it easier for new energy sources to come online.

Ambitious targets

Peter Nichols grew up in Lee County: swimming and canoeing in the Rock River, and accompanying his grandfather on visits to his farmland.

"We'd go around every week and collect eggs and check on the cattle," he recalled.

It was the kind of childhood that forges deep ties to the land, and Nichols, a retired doctor and emeritus professor in Southern California who visits Lee County regularly, said that when he and his siblings received offers to lease land to two local solar projects, they took the decision seriously.

They spent a lot of time discussing the pluses and minuses, including the opportunity solar would offer to let the land recover from the demands of corn and soybean farming.

They decided solar was the right choice for them about four years ago, Nichols said, and then they waited.

"We're attached (to our land), we want things that are good for it, and now we're kind of just held in limbo. That's aggravating," Nichols said.

The grid-connection slowdown has affected a wide swath of people, including landowners who plan to lease to developers and the growing number of companies—including data centers—that want to use clean energy.

States such as Illinois, which have set ambitious targets for wind and solar energy, are feeling the impact as well.

A 2023 Natural Resources Defense Council report found that the PJM grid-connection process isn't currently getting new wind and solar farms online fast enough to put Illinois on pace to meet its clean electricity goals. And a recent planning report from the Illinois Power Agency said grid-connection delays—along with supply chain issues and the amount of time needed for construction—create a "significant challenge" for ambitious state clean-electricity targets.

Still, advocates and experts are heartened by increasing attention to grid-connection delays nationwide, including a 2023 order from the Federal Energy Regulatory Commission requiring reforms to the grid-connection process.

Another federal order, addressing long-term planning of the high-voltage grid, is expected this year, and federal regulators are looking into other improvements.

Rand said there is a lot more room to improve the grid-connection process, but he is "optimistic" that the country is at or near the peak of

the problem.

Gramlich, whose résumé includes a stint as a senior PJM economist in the late 1990s, said that every problem in the grid connection scorecard report is solvable, and in each case, someone around the country is doing things right.

"Now really all we need to do—at the risk of oversimplification—is identify those activities that work and get everybody else to adopt those activities," he said.

Rooftop view

On a brisk afternoon in March, Lee County offered evidence of the delays—and a glimpse of what could lie beyond.

When Henkel pulled her SUV to a stop next to a piece of farmland promised to the Steward Creek solar farm, bare fields stretched for miles, interrupted, here and there, by a few lonely landmarks—a house, a water tower, a smattering of leafless trees.

There was nothing to suggest rows of sleek black panels, turning in tandem to follow the sun, until Henkel offered up her cellphone, with photos she had taken during a visit to a big solar farm in Coles County in central Illinois.

She had actually climbed up on top of her car to get a better view of the panels, she said.

"It's hard to really grasp it from the ground level, because of how tall they are," she said. "Then once I got up there I was like, 'Oh my God, this is quite the sight.'"